Climate Change and Museum Futures

Climate change is a complex and dynamic environmental, cultural and political phenomenon that is reshaping our relationship to nature. Climate change is a global force, with global impacts. Viable solutions on what to do must involve dialogues and decision making with many agencies, stakeholder groups and communities crossing all sectors and scales. Current policy approaches are inadequate and finding a consensus on how to reduce levels of greenhouse gases in the atmosphere through international protocols has proven difficult. Gaps between science and society limit government and industry capacity to engage with communities to broker innovative solutions to climate change.

Drawing on cutting-edge research and creative programming initiatives, this collection details the important roles and agencies that cultural institutions (in particular, natural history and science museums and science centers) can play within these gaps as resources, catalysts and change agents in climate change debates and decision-making processes; as unique public and transnational spaces where diverse stakeholders, government and communities can meet; where knowledge can be mediated, competing discourses and agendas tabled and debated, and where both individual and collective action might be activated.

Fiona R. Cameron is Senior Research Fellow at the Institute for Culture and Society, University of Western Sydney, Australia. She was the lead Chief Investigator on the Australian Research Council Linkage project, "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions." This collection is an output from this project.

Brett Neilson is Professor and Research Director at the Institute for Culture and Society, University of Western Sydney, Australia. With Sandro Mezzadra, he is author of *Border as Method, or, the Multiplication of Labor.* He currently leads the tricontinental research project *Logistical Worlds: Infrastructure, Software, Labour* (http://logisticalworlds.org).

Routledge Research in Museum Studies

1 **Contesting Human Remains in Museum Collections**
The Crisis of Cultural Authority
By Tiffany Jenkins

2 **Museum Gallery Interpretation and Material Culture**
Edited by Juliette Fritsch

3 **Representing Enslavement and Abolition in Museums**
Edited by Laurajane Smith, Geoff Cubitt, Kalliopi Fouseki, and Ross Wilson

4 **Exhibiting Madness in Museums**
Remembering Psychiatry through Collections and Display
Edited by Catherine Coleborne and Dolly MacKinnon

5 **Designing for the Museum Visitor Experience**
By Tiina Roppola

6 **Museum Communication and Social Media**
The Connected Museum
Edited by Kirsten Drotner and Kim Christian Schrøder

7 **Doing Museology Differently**
By Duncan Grewcock

8 **Climate Change and Museum Futures**
Edited by Fiona R. Cameron and Brett Neilson

Climate Change and Museum Futures

Edited by Fiona R. Cameron and Brett Neilson

Routledge
Taylor & Francis Group
NEW YORK AND LONDON

First published 2015
by Routledge
711 Third Avenue, New York, NY 10017

and by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

Routledge is an imprint of the Taylor & Francis Group,
an informa business

Library of Congress Cataloging-in-Publication Data

[CIP data]

ISBN: 978-0-415-84391-1 (hbk)
ISBN: 978-0-203-75297-5 (ebk)

Typeset in Sabon
by Apex CoVantage, LLC

Contents

Figures

Acknowledgments

Climate Change and Museum Futures has been a rewarding endeavor, made possible by the professional and personal generosity of the twenty-five authors whose work forms this collection. The authors' willingness to contribute their thoughts, research and time to producing such a publication made it possible for the editors to assuredly approach their task, and to produce a work of significance to the sector. We thank you all. First, and most importantly, we would like to thank Routledge/Taylor & Francis (New Research in Museum Series) and in particular commissioning editor Laura Stearns, for accepting the proposal for publication, and to editorial assistant Lauren Verity for steadfastly steering the collection from its inception to a successful conclusion.

The collection was conceived out of an Australian Research Council Linkage project "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions" (2007–2011) in which Fiona Cameron, Bob Hodge, Brett Neilson, Juan Francisco Salazar, Jann Conroy and David Karoly were chief investigators. The project's findings form and inform many of the discussions. We would also like to extend our appreciation to the museum partners and partner investigators on "Hot Science," the Australian Museum and Lynda Kelly; the Powerhouse Museum and Seb Chan; Questacon and Graham Durant; Museum Victoria and Carolyn Meehan, Australia; the Liberty Science Center, Jersey City, New Jersey, USA and Wayne LaBar and Richard Sandell, School of Museum Studies, University of Leicester, UK. Special thanks also to the researchers who worked on the project, Ben Dibley, Carol Farbotko, Anne Newstead and Anne Deslandes, to Scott East, the Ph.D. candidate and to the invited keynote and plenary speakers at the "Hot Science" concluding symposium (May 4–5, 2011), Mike Hulme, Elaine Heumann Gurian and Emlyn Koster, whose insights are included in the final chapter.

The successful completion of this book would not have been possible without the support of the Australian Research Council, the Institute for Culture and Society, University of Western Sydney, Australia, the Rachel Carson Centre, Ludwig Maximillians Universität and the Deutsches Museum, Munich, Germany.

Introduction

Climate Change, Museum Futures

Fiona R. Cameron and Brett Neilson

Climate change and museum futures—these are the two main themes that contributions to this edited volume negotiate. Climate change is a complex and dynamic environmental, cultural and political phenomenon that is undeniably reshaping the way we live in the world, our relationship to nature and humanity's place on earth in the present and for the future (Hulme 2009). It is a global force with global impacts. Viable proposals on what to do must involve dialogues and decision making with agencies, stakeholder groups and communities that cross all sectors and scales. The science is clear. The earth is warming. However, controversy continues to surround the significance of the risks that climate change poses, the causes of warming, the scale and pace of future impacts and what regulations, policies and investments might obviate damage locally and globally (IPCC 2007; Hulme 2009).

Current policy approaches have proven inadequate and finding a consensus on how to reduce levels of greenhouse gases in the atmosphere through international protocols has been difficult. The assessment of risk, prevention and mitigation is currently dominated by science, economic considerations, stakeholder interests and government priorities that have not attended sufficiently to community practices and social and cultural contexts. Gaps between science and society limit the capacity of government and industry to engage with communities to deliver innovative responses to climate change.

Drawing on cutting-edge research and creative programming initiatives, this collection details the important role that museums, in their various forms, can play within these gaps. *Climate Change and Museum Futures* explores how museums can act as resources, catalysts and change agents in climate change debates and decision-making processes. The volume is also interested in how museums provide unique public and transnational spaces where diverse stakeholders, government and communities can meet, mediate knowledge, table and debate competing discourses and agendas, and create openings for individual and collective action.

Bringing climate change into analytical and political relation with museum futures offers a unique and original perspective on one of the most

pressing global challenges of our times. Climate change is a geophysical process whose reality and scientific validity is ascertained through complex statistical calculation and model building. Museum futures, by contrast, describe the opportunities, dangers and potentials faced by a modern cultural institution that is undergoing change due to economic pressures, shifting social expectations and new kinds of relations with audiences and publics. Recent times have seen shifts in the disciplinary formations that inform museum philosophies and practices. The changing spatial and temporal configurations of globalization have positioned museums within unstable assemblages of communication, finance, data flows, and technological and scientific processes. As such their future is volatile, at once open to possibilities for experimentation and susceptible to political and social influences that can rigidify their practices and close off opportunities for exploring contentious issues. This is why museums are contested spaces when it comes to dealing with entrenched and genuinely confounding concerns such as climate change.

Between the poles of climate change and museum futures there exists a whole spectrum of issues and practices that influence not only questions of authority, expertise and knowledge at either end, but also the ways in which these phenomena interact: policy and media debates, technological innovations and fixes, market mechanisms, protest movements, governmental systems and so on. In investigating the links between climate change and museum futures, the chapters in this volume encounter and analyze many of these issues and practices. In doing so, they discover that neither climate change nor museum futures provide a stable anchor with which to ground such encounters and analyses, either epistemologically or ontologically.

Although the science of climate change is definitive, it is the subject of polarized and often harsh public disagreement, illustrating the emotional and communicative gap that separates scientific discovery from public knowledge. It is tempting to assign the museum the role of filling this gap. However, as the authors of this volume conclude, positioning the museum as the neutral arbiter and translator of scientific truth fails to acknowledge its delicate, and often unstable, position in wider arrays of social influence, political power, commercial transaction and cultural controversy. This is the case no matter how much scientists or publics hope or believe the museum can play such a role. Besides this, there are many different kinds of museums, not only with regard to their type or genre (e.g., science as opposed to art museums), but also in terms of internal governance and administration, exhibtionary and programming practice, funding arrangements, pedagogical mission and, ever more important in an age of expanding information technology, the malleability of their borders with other institutions and parts of society. Museums are extremely heterogeneous institutions and this means that they can adapt and innovate as a sector, even if in individual instances many remain quite conservative and even disciplinary institutions. It also means that an edited volume provides the most appropriate way in

which to survey and analyze the plurality of ways in which museums are responding to climate change.

In commissioning and editing these chapters we have been conscious of the need to represent this diversity. This is why the volume includes discussions of various programming initiatives in different parts of the world, across different kinds of museums and, in some instances, involving independent artistic or social activist practices that exist in relative degrees of distance and proximity to the museum's formal institutionality. The hunch here is that it is from the museum's borders that innovative future practice is most likely to evolve. But the volume does not restrict itself to examining how museums react to climate change debates and urgencies. Indeed, the scope of book's content that ranges beyond what we might narrowly define as museum activities is a feature of this volume and is most pronounced in (although not restricted to) the "programming interludes" that punctuate the more substantive chapters. Our ambitions for this collection cannot be fully contained by the narrow, if interdisciplinary, field of museum studies. We draw on a range of disciplinary and interdisciplinary perspectives as a way of cutting into and across the multifarious issues and practices that inform the museum and museum-like collective forms of activity as both actors and arenas of conflict and intervention.

Recent research in human and cultural geography seeks to reframe climate change as a social and cultural issue underlying the science. In his chapter entitled "Why We *Should* Disagree about Climate Change," Mike Hulme observes that climate change means different things to different people in different locations based on their ideologies, values and views of the world. Attitudes and practices vary with regard to nature, the economy, ethical frameworks and perceptions of what is at stake. There are also numerous and diverse perceptions of consumption, economic growth, sovereignty, species extinction, the poor or distant others and our responsibilities toward them. This, according to Hulme, is why we can't agree on what to do. These fragmentary dynamics, contradictions and the lack of reliable scripts for action, he argues, have deep implications for the governance of climate change. Rather than seeing stopping climate change as the single unattainable utopian project that must be mobilized at all costs, Hulme suggests that governance is better operationalized as small steps in a polycentric world of pluralist views and preferences, and as a phenomenon that gives us new resources, new insights and new vocabularies that can be used creatively to innovate, change and diversify. Hulme encourages us to think differently about climate change as an idea, phenomenon and object of governance. Consequently our views and actions regarding climate change and the roles of museums in shaping and responding to them must also be rethought.

Faced with the complex, dynamic challenges posed by climate change as an entangled environmental, social and political predicament, a renewed philosophical inquiry must be made into the museum idea and museums as institutional forms. Climate change challenges established museum concepts

and practices as well as the reputation of museums as places of influence and certainty. In this light, we need to rethink the position of museums as sites for the production and representation of science as well as their involvement in a temporal project largely framed in the past. This means interrogating the established foundations of trust and legitimacy upon which the public reputation of museums is built, questioning their role as pedagogic institutions and places of reform within governing arrangements, and contesting the hierarchical organizational forms that structure their operations. If museums are to be agents of change they need to adapt their operations rapidly across different scales and to institute polycentric responses forming new cross-sector alliances, new relationships with audiences and extended networks that bring together disparate people, ideas and institutions across social and geographical distances. In so doing, they must also engage with more complex modes of communication, deal more effectively with dissent and conflict in transnational and cosmopolitan formations, and bring together the past, present and future as a focus for concern and modality for formulating creative thought and action.

Fiona Cameron's chapter, "Ecologizing Experimentations: A Method and Manifesto for Composing a Post-Humanist Museum," examines the residual faith in modern humanism, Cartesian rationality and dualistic logic that continues to inform museum philosophies and practices. Cameron investigates the ways these knowledge practices are loaded into various techniques and technologies such as programs and exhibitions. She also discusses the growing awareness of the limitations of these world views for thinking and acting on climate change across disciplines, in museum scholarship and practices. Drawing on Bruno Latour's political project of "ecologizing" as opposed to "modernizing" and new developments in the post-humanities, Cameron proposes novel "ecologizing experimentations" to conceptually reframe the museum and its practices according to a post-Cartesian, more-than-human approach to the make-up and composition of the world.

We are interested in how museum futures are shaped by the way that climate change, as Dipesh Chakrabarty (2009, 197–198) puts it, saturates "our sense of the now." If we take seriously Chakrabarty's argument that climate change is a process that "poses for us a question of human collectivity" (222) at the same time as it challenges the boundaries between human and natural history, we are confronted with epistemological challenges to the very idea of the modern museum, which, as Cameron notes in her second contribution to the volume entitled "We Are on Nature's Side?," rests on the humanist commitment to a strict division between nature and culture. These are also themes taken up in Ben Dibley's chapter on the idea of cosmopolitanism in museum practice. Dibley contrasts official museum declarations on heritage and human impacts on the biosphere with critical articulations of cosmopolitanism to suggest that museums face an uphill battle in adjusting themselves to the challenges of climate change. How natural history and science museums might work with and represent new

disciplinary approaches and concepts that dissolve the boundaries between nature and culture is illustrated in Luke Keogh and Nina Möllers chapter. Working with the concept of the "Anthropocene," a new geophysical descriptor where humans are posed as a force of geological scale and intensity, Keogh and Möllers detail the development of the exhibition "Welcome to the Anthropocene: The Earth in Our Hands" opening in December 2014 at the Deutsches Museum, Munich, Germany. The chapter concludes with insights into curating the Anthropocene as an encompassing and transdisciplinary concept that poses diverse challenges, but also offers opportunities to museums.

For many of the authors writing in this volume, the environmental crisis marked by climate change is matched by what might be described as an institutional crisis of the museum, which is also a phenomenon described by museum studies scholars who do not directly share our concerns with climate change (see, for instance, James 2009). In this sense, climate change guides us to the very limits of the museum form and compels us to investigate experiments in programming and practice that reformat and test the boundaries of the museum as well as its internal workings, structures and governance processes.

Operating at the borders of museum as a temporal project, Juan Salazar explores the potential for museums and science centers to work as futuring agencies through the notion of anticipatory practices. Salazar argues that museums and science centers, as key institutional nodes within broader communicative ecologies, have an important role to play in making climate futures intelligible, actionable and rendering feasible a more inclusive public debate. Gareth Priday, Tim Mansfield and José Ramos grasp the notion of museum futures through the lens of foresight and futures studies. In bringing together our central concerns: museums, climate change and futures as well as the differing conceptions of temporality, methodologies and humanity that arise from these engagements, the authors build on Salazar's work and suggest ways that institutions can develop futuring conversations through programming. Drawing on the devastating Black Saturday bush fires in Victoria, Australia on Saturday February 7, 2009, Christine Hansen in "Curating Fire" provocatively challenges museums to act not only as anticipatory agents in respect to futuring conversations, but as organizations that can issue warnings about the future. Hansen calls for institutions to give over gallery space to stories of fire and lead a new public pedagogy. She shows how collections can play a vital role in the affective resonance of stories of fire in these broader pedagogical processes. Tarisi Vunidilo's interlude shows how the Pacific Island Museums Association operates as a warning mechanism to Pacific Island communities. Importantly she showcases how this organization is moving beyond the fear of catastrophe to prepare youth to plan for the futures of their vulnerable communities in a context where many will lose their homes and become subject to extreme weather.

Bob Hodge's chapter explores a practical instance of museum innovation with respect to public communication on climate change. Drawing on the resources of complexity theory, Hodge proposes the model of "trialogs" as a means for museums to avoid communication strategies that seek either to remain above all controversy or to engage in endless battles concerning climate change. Practically, this involves the staging of three-way public conversations that draw experts into dialogue with others in different fields of specialism and knowledge as well as people who may not share their views and opinions. The aim is to build trust by organizing and managing controversy rather than demonizing climate change skepticism or ignoring disagreement in favor of an authoritative pedagogical mission, both tactics that might backfire in terms of the shaping of public opinion both about climate change and museums. In their interlude "Visualizing Climate Change," Tina-Simone Neset and Ola Uhrqvist explore the potential for facilitating public conversations and exchanges with affinities to Hodge's trialogs through the visualization of science information that illustrates the causes and effects of climate change as well as links to climate mitigation, adaptation, and related policies.

Hodge's injunction for museums and science centers to deploy such potentially self-undermining strategies as trialogs has affinities with what has become known in the world of art museums and galleries as "institutional critique." This involves critical commentary on the conventions and institutions of art through artistic practice and exhibitions that question the shibboleths of aesthetic judgment and autonomy by mapping out and testing the historical and social boundaries that separate the museum from the outside world. Kellie Payne's chapter explores how responses to climate change in art museums and galleries are changing and challenging the terms of institutional critique as it has become embedded in museum and gallery practice since the 1970s. Although some attempts to confront the theme of climate change in mainstream art museums remain ensconced in established art world practices there are also edgier and alternative practices that hold a more tenuous relation to major art institutions. Payne asks difficult questions about the assumption that political art can exist only outside the museum or gallery and also interrogates how issues of quality and aesthetics haunt critical art practices that engage with climate change. These themes are also present in Brett Neilson's account of how the cultural program at the 2009 United Nations Climate Conference (COP15) held in Copenhagen negotiated the political machinations of global governance and activism that emerged at this event. Neilson focuses on a particular instance in which an activist artwork was commissioned and then rejected by a prominent Copenhagen art museum involved in this cultural program. His investigation suggests the ongoing difficulty of negotiating the inside/outside division in both museum practice and climate governance.

If, as Neilson concludes, possibilities for institutional critique have been fully incorporated into the contemporary art world, it is also necessary to

ask to what extent the current political and economic pressures under which museums operate affect their capacity to host and/or produce meaningful political works on climate change. In a wider exploration and critique of the idea of "green citizenship," Toby Miller, Richard Maxwell and George Yúdice discuss how the sponsorship of museums by polluting businesses and corporations provides a "social license to operate" for such organizations. Similarly, Ashley Dawson explores some of the pitfalls that beset the representation of "climate refugees" in documentary and art practices. Scott East provides a more hopeful account of how museums can host critical exhibitions and interventions, in this case a crocheted version of the Great Barrier Reef, which mobilize cultural energies toward social transformation. In the programming interlude coauthored by Nigel Heyler and Mary-Anne Lea as well as in that written by Cecelia Cmielewski, we find examples of art practices conducted in collaboration with scientists that bypass the museum sector to offer thoughtful and nuanced commentary on climate change that exceeds didactic and descriptive approaches. Similarly, Mauricio Corbalan's account of new media activist practices surrounding a polluted river in Buenos Aires suggests how political entanglements with climate change can be most powerful when engaged in the invention of new institutional forms that are not immediately connected to the museum world but may provide leads on how to reshape it.

This collection grew out of the Australian Research Council–funded Linkage project, "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions" (2007–2011), hosted by the Institute for Culture and Society (then the Centre for Cultural Research) at the University of Western Sydney. The project was conducted in collaboration with five museums and science centers in Australia (Powerhouse Museum and Australian Museum, Sydney; Museum Victoria, Melbourne; Questacon, Canberra) and the US (Liberty Science Center, Jersey City, New Jersey) and two universities (University of Melbourne, Earth Sciences and School of Museum Studies and University of Leicester). Its primary purpose was to investigate how the museum sector can participate more fully in climate change interventions and decisions.

"Hot Science" built a more complete picture of the current climate change debate, in particular its policy and cultural aspects. It also examined how different players influence that debate and explored the current and potential roles of science, natural history museums and science centers in these processes. Four contributors to this collection—Fiona Cameron, Bob Hodge, Brett Neilson, and Juan Salazar—were also chief investigators on the project. Ben Dibley was a research officer on the project. Scott East was the Ph.D. candidate on "Hot Science." Scott's contribution to the volume develops a chapter from his thesis.

The "Hot Science" research showed that museums and science centers are important and powerful venues in climate change governance and in coordinating a global response. They are regarded as trusted, reliable information

sources—second only to science organizations, and way ahead of government and corporations. They have a role to play in communicating the full complexities of science and providing new perspectives on climate change as a complex scientific, cultural, economic and social issue. Museums can also offer a range of views and inputs into policy scenarios, and act as congregational spaces for cross-sectorial conversations on future ways of living with climate change. The investigators showcase many of these findings in their respective chapters. The concluding chapter by Fiona Cameron, Bob Hodge and Juan Salazar present some of the findings from "Hot Science" and discussions from the concluding symposium to develop a manifesto for museums and climate change engagement.

Climate Change and Museum Futures also gathers research and expertise beyond the central concerns of the "Hot Science" project. The authors selected for this volume are some of the key academics and professionals producing international scholarship on climate change and/or engaging practically with this issue through curatorial and practice-based programming initiatives. This expertise spans a range of fields from climate change science to critical museum and cultural studies (including theories and practices of globalization and social movements) to communication, media studies, visual culture, art and affect studies, semiotics, discourse analysis, and futurology and forecasting. The net result is a collection of chapters that widely surveys climate change debates and museum futures to consider both theoretically and empirically how relations between the two are reshaping practices and belief systems at either end. Whether through artistic or scientific inventions, questionings of the nature/culture divide, or exercises in designing new kinds of institutions either inside or outside the museum, the chapters and "programming interludes" that follow open avenues of inquiry that query and shift the terms in which the museum world meets the global and planetary challenges of climate change.

REFERENCES

Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35: 197–222.

Hulme, Mike. 2009. *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity.* Cambridge: Cambridge University Press.

Intergovernmental Panel on Climate Change. 2007. "Climate Change 2007: The Physical Science Basis: Summary for Policymakers." http://ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm

James, Robert. 2009. *Museums in a Troubled World: Renewal, Irrelevance or Collapse*. New York, NY: Routledge.

1 Why We *Should* Disagree about Climate Change

Mike Hulme

QUANTIFYING CONSENSUS

In May 2013, John Cook and colleagues published a paper in the journal *Environmental Research Letters* titled "Quantifying the consensus on anthropogenic global warming in the scientific literature" (Cook et al. 2013). The paper made a number of claims, most notably that among the 4,014 peer-reviewed papers expressing "a position on anthropogenic global warming, 97.1% endorsed the consensus position that humans are causing global warming" (Cook et al. 2013, 1). The paper was heavily promoted through various mainstream and social media and was widely discussed and debated on climate change blogs and comment sites. Cook's paper was merely the latest in a series of articles published in peer-reviewed journals which have used large-scale surveys to quantify scientific consensus about climate change. Naomi Oreskes was perhaps the first high-profile study to do this (Oreskes 2004), followed by Doran and Zimmerman (2009) and by Anderegg et al. (2010). Oreskes argued that of the 928 peer-reviewed scientific papers she surveyed, "Remarkably, none of the papers disagreed with the consensus position on climate change." The two later studies found similar levels to the Cook et al. study of "consensus agreement" among climate scientists, respectively 97.4% who think human activity is "a significant contributing factor" to climate change and between 97 and 98% who "agree with the consensus position on climate change" expressed by the Intergovernmental Panel on Climate Change.

Neither the adequacy of the methods used in these studies nor their precise outcomes are the primary focus of my concern. I am more interested in the underlying motivation for them. Why do the scientists involved in these studies think it is necessary to undertake this form of enumeration? Are they seeking to win a particular argument by sheer weight of numbers? And are these polls of climate scientists any more important than comparable large-scale surveys of public opinion which seek to establish the extent of public consensus, as opposed to the consensus of climate scientists, on climate change?

For example, Yale University's *Climate in the American mind* project has shown, in a series of surveys dating back to 2008, that a consistent majority

of American citizens believe the climate is warming and that humans are implicated. Although these numbers have fluctuated by up to 10 percentage points, the most recent survey from April 2013 (Leiserowitz et al. 2013) shows that among those citizens who express a position, there is a ratio of more than 3-to-1 in favor of the reality of global warming. And similar public polling in other countries around the world have, in nearly all cases, shown national-level majorities in favor of such beliefs (e.g., see the GlobeScan survey from November 2009 [HSBC 2009]). One could also quantify consensus about climate change in other settings: for example, the almost universal ratification by sovereign governments of the 1992 UN Framework Convention on Climate Change or the assent of over 95% of national governments to the 2009 Copenhagen Accord. What do these clear, even overwhelming, consensuses about climate change among climate scientists, the general public and sovereign governments tell us? They seem to suggest that scientists, citizens and governments are in widespread agreement that humans are an active and significant agent in changing the climate. Case made!

So what more is it that politicians, policy advocates and climate change campaigners want to know? Why did John Cook and his climate change colleagues feel the need in 2013 to conduct another survey of climate scientists and to go to great lengths to attract media attention to the result? I can only speculate as to their motives but I suspect it arises from the assumption, held not just by these authors, that successful implementation of climate policies—whether nationally or internationally—depends crucially on a scientific consensus about the detection and attribution of climate change to human activities. If so, this reveals an underlying adherence to a linear model of science-policy interaction (e.g., Millstone 2005): knowledge drives policy, consensual knowledge is more likely to drive consensual policy, and so quantifying the strength of the scientific consensus—the closer to 100% the better—drives forward the likelihood of strong and effective policy action.

But the above examples of enumerating the strength of consensus around climate change are largely irrelevant to the nature of climate politics. What matters is not whether climate is changing (yes it is), nor whether human actions are to blame (yes they are, at least partly and possibly largely—the precise *extent* of human agency was, in fact, a question on which Cook et al.'s 2013 survey was ambiguous), nor whether future climate change carries additional risks to human or nonhuman interests (yes it does), nor whether government representatives will sign up to nonbinding aspirational statements about what needs to be done (why wouldn't they?). The question that matters, the *only* question that matters in the end, is "so what?"

CLIMATE CHANGE IS POLITICAL

The answer to the question "what sorts of policy response to human-caused climate change are desirable, appropriate and possible?" is of course deeply

political. The answer will only be found through ongoing negotiation of different social interests operating across and within national jurisdictions. And it shows the fallacy of the linear model of science-policy interaction. Climate change, we might say, is a political problem before it is a scientific fact.

Consensus about the scientific evidence that humans are altering the climate system is not much help here. There is no inevitable policy response that follows from the fact that climate change is largely (partly?) human caused. (Similarly, there is no self-evident political, theological or ethical truth that follows from the fact that humans and other species have evolved through processes of natural selection.) And nor would there be if it was established—again through consensus-making processes—that the range of future global warming is very likely to be, say, in the range of 2 to 4 degrees Celsius over the next 100 years. Such knowledge might certainly warrant a vigorous political debate on what response might be desirable, but consensus knowledge claims don't make the outcome of this debate any more self-evident. Even if one takes the Cook et al. study at face value, how does a scientific consensus of 97.1% make policy making about climate change any easier? As Roger Pielke Jr. has often remarked in the context of American climate politics (e.g. Pielke 2013), it is not a lack of a majority public belief about the reality of human-caused climate change that has made climate policy implementation in the United States difficult. Polling data collected over twenty-five years has always yielded a clear majority of American citizens accepting this reality, and yet this consensus has hardly driven forward national climate policies in that country.

The dividing line in climate change debates is between those who think that climate change is such a totalizing and overwhelming existential threat that normal politics must be suspended and those who recognize that human living is political before it is natural. But climate, as "nature" understood more broadly (Castree 2013), can never mean one thing. Less still can "climate change" mean one thing, with its provocative mixture of believed human, nonhuman and divine causes. Disputes over the meaning of climate change and the forms of political response that are appropriate can never be resolved by appeal to science. Being "armed only with peer-reviewed science"—as claimed by the UK climate protestors of summer 2007 against the proposed third runway at London's Heathrow Airport (Climate Resistance 2007)—is never enough. The meaning of scientific facts is always culturally mediated and politically contested. So is the meaning of climate change.

So politics, not science, must take center stage. As Amanda Machin shows in her book *Negotiating Climate Change: Radical Democracy and the Illusion of Consensus* (Machin 2013), asking climate scientists to forge a consensus that will enable decisive political action misunderstands climate, science and politics in equal measure. If democratic politics is to be effective we need more disagreement, not more consensus, about what climate change is really about. As Machin (2013, 5) argues,

> Consensus on how to combat climate change cannot and will not ever be reached; there is no one 'rational' path to take, no overarching grand green scheme that suits everyone. Any apparently inclusive agreement and rational discussion is rather a trick of power that disguises exclusion and inequality.

And driving always for consensus, whether in science or in politics, may not just be unhelpful. It can also be dangerous. Aggrandizing projects of Earth System Governance or climate engineering or a global carbon market are nothing short of political mega-projects, justified by some in the name of science as essential and nonnegotiable. But Machin (2013, 2) again shows the dangers of such steam-rolling, noting that "The myth of consensus . . . is perhaps the biggest problem facing climate change politics today. Assuming political consensus as a horizon marginalizes those who dissent and undermines the role of disagreement in politics."

The argument about global-scale solar climate engineering, for example, has to be political before it can be scientific (Hulme 2014). The urgency is not to debate how these putative solar reflection technologies can be governed should they be necessary, but rather to give voice to a multitude of arguments about why such a response to climate change is or is not desirable. And these voices must be heard from around the world—otherwise we are entering a new era of tyranny and the mighty power of naturalism will suppress the creative and legitimate tension of agonistic human beings. Speaking in a wider context about agonistic politics, the political theorist Chantel Mouffe argues that "Taking pluralism seriously requires that we give up the dream of a rational consensus which entails the fantasy that we could escape our human form of life" (Mouffe 2000, 98).

THE ROLE OF MUSEUMS

So what does the argument outlined above imply for the role of museums in representing to their audiences the idea of, and evidence for, climate change? It can hardly mean that museums should not engage with climate science, least of all those museums or science centers whose very mandate has science education enshrined at their heart. But museums shouldn't limit their representation of climate change to climate science. As I have argued elsewhere (Hulme 2009), the more important questions that the idea of climate change raises are those that extend beyond science. They even extend beyond merely rational discourse—if by rationality we exclude forms of knowing which are embodied in cultural tradition and the human imagination. Museums when representing climate change would therefore do well to draw attention to the range of different human cosmologies, values and aspirations with which the idea engages.

Let me suggest four public-interest questions that lie at the very heart of the human response to the idea of humans as an agent of climate change. I believe these questions are much more important than those asked of climate scientists in the Cook et al. study cited above. And museums should engage their audiences in reflecting on and deliberating their own answers, free from any tyranny introduced by notions of "the correct (consensual)" answer. These are questions that humans should and do disagree about.

My first question is to get audiences thinking about how they value the future—or what is known in analytic economics as the discount rate. Many of the arguments about urgent versus delayed interventions to reduce the growth rate of greenhouse gas emissions revolve around this question: Do we value public goods in the future the same as, or less than, they are valued today? This is a question that clear-thinking people will disagree about.

My second question is " What is the role and efficacy of markets in the governance on climate change?" Many arguments about climate change, as about environmental management more generally, revolve around the extent to which commodification of nature—putting a tradeable price on an environmental good—is seen as part of the problem rather than part of the solution. Museums can help audiences understand the significance and consequences of this argument.

Third, it is important to provoke citizens to ask the question, "How should new technologies be governed—from experimentation and development through to deployment?" In relation to climate change this question of governance might apply to new or improved low carbon energy technologies (such as fracking, new nuclear, hydrogen fuel), or to the use of genetically modified crops as a climate adaptation strategy or to proposed climate engineering technologies to alter the solar heat flux. How such technologies are governed is, again, not one upon which science, least of all a scientific consensus, can adjudicate (although scientific evidence may be relevant to feed the debate).

My fourth question that museums seeking to engage audiences about climate change should raise in citizens' minds is, "How should national sovereignty be conceived in today's world?" This becomes especially important in relating the legitimacy of national governance with that of multilateral or transnational entities and regulations. This question requires citizens to reflect on forms of democracy and representation, a question no less important in relation to climate change than it is in relation to state security, immigration or financial regulation.

Any considered response to climate change will need to take a position—implicitly or explicitly—on one or more of these four questions and others besides. It is therefore important that public conversations about climate change are stimulated around these and other challenging topics. These questions offer more engaging and constructive debates for museums to cultivate than the rather obtuse and narrow questions that the consensus-quantifiers are asking of climate scientists. And such an approach would reveal the

largely irrelevant nature of such consensus-counting exercises. Whether it is 90.8% or 97.4% of climate science papers that accept that "humans are causing global warming" has little to no bearing on public deliberations about the four questions I introduce above. The lack of accuracy and precision about the nature of the future risks climate change poses for society opens up spaces for legitimate disagreement about how best to respond.

SAFE SPACES FOR DANGEROUS IDEAS

This chapter has sought to defend the claim that, we *should* disagree about climate change. Or, to pose this as a question, "Is there only one correct answer to climate change that all enlightened, rational and well-meaning citizens must give—an answer that people will be helped to discover by revealing the breadth and depth of scientific consensus about the causes of climate change?" My answer, of course, is not just that it *is* OK to disagree—especially when it comes to those aspects of climate change that really matter, which are not "is the world warming?" or "are humans causing it?" but rather that it is politically *necessary* for us to disagree about climate change. The aspects of climate change that really matter for human and nonhuman life entail debates about values and about the forms of political organization and representation that people believe are desirable.

And here there is a crucial role for museums to play in allowing dangerous ideas to circulate in safe spaces: places where people are allowed to disagree, to express their comprehensive moral doctrines, their cultural priors, but to do so in ways which are agonistic and not antagonistic. This is to allow people to be Habermasian rationalists in their public discourse about climate change, even while the forms of rationality being allowed extend beyond simply liberalism and scientism (Habermas 2006). The purpose of museums is not to get everyone thinking the same thing about climate change. This would be unattainable and undesirable. Rather it is to allow people for whom the idea of climate change provokes different stories of meaning—different visions of a good and desirable future—to listen and to learn from each other. In the end, climate change offers a deeper challenge to the human political project—namely the creation of a political community, or perhaps the creation of nested communities rather than of a Great Community (cf. Dewey 1927)—than it does to the existential status of life on Earth.

In this sense, museums need to be more political and less scientific when it comes to representing climate change. This politicization will present difficult challenges for the governance, content management and marketing of museums. But if museums are to truly act as places of public learning and engagement, then ways must be found of bridging the unhelpful separation of facts and values, of knowledge and meaning. Climate change is an idea of such enormous reach and significance that it provides an ideal platform from which to undertake this re-connection. Museums are not

institutions that simply report on how the world is or has been. Museums should fulfill their democratic mission by also opening up informed spaces for public reflection and deliberation on how the world might and should be. This, after all, is what politics is. There is no set of questions about future political and cultural life on Earth that ranges more widely than the set of questions—examples of which I have given above—thatthe prospect of a human-shaped future climate require us to confront.

REFERENCES

Anderegg, William R. L., James W. Prall, Jacob Harold and Stephen H. Schneider. 2010. "Expert Credibility in Climate Change." *Proceedings of the National Academy of Sciences* 107(27): 12107–12109.

Castree, Noel. 2013. *Making Sense of Nature*. London/New York: Routledge.

Climate Resistance. 2007. "Climate Science: Truth You Can Wear on Your Hands." *Climate Resistance Blog,* October 17. www.climate-resistance.org/2007/10/climate-science-truth-you-can-wear-on-your-hands.html

Cook, John, Dana Nuccitelli, Sarah A. Green, Mark Richardson, Bärbel Winkler, Rob Painting, Robert Way, Peter Jacobs and Andrew Skuce. 2013. "Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature." *Environmental Research Letters* 8, 024024. doi:10.1088/1748–9326/8/2/024024

Dewey, John. 1927/1946. *The Public and its Problems*. Athens: Ohio University Press.

Doran, Peter T., and Maggie K. Zimmerman. 2009. "Examining the Scientific Consensus on Climate change." *EOS Transactions American Geophysical Union* 90(3): 22–23.

Habermas, Jürgen. 2006. "Religion in the Public Sphere." *European Journal of Philosophy* 14(1): 1–25.

HSBC. 2009. "Climate Confidence Monitor 2009." www.globescan.com/news_archives/hsbc_climate/

Hulme, Mike. 2009. *Why We Disagree about Climate Change: Explaining Controversy, Inaction and Opportunity.* Cambridge: Cambridge University Press.

Hulme, Mike. 2014. *Can Science Fix Climate Change? A Case against Climate Engineering*. Cambridge: Polity.

Leiserowitz, Anthony, Edward Maibach, Connie Roser-Renouf, Geoff Feinberg and Peter Howe. 2013. *Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in April 2013*. New Haven, CT: Yale University and George Mason University.

Machin, Amanda. 2013. *Negotiating Climate Change: Radical Democracy and the Illusion of Consensus*. London: Zed Books.

Millstone, Erik. 2005. "Analysing the Role of Science in Public Policy-Making." In *BSE: Risk, Science and Governance,* edited by Patrtick van Zwanenberg and Erik Millstone 15–43. Oxford: Oxford University Press.

Mouffe, Chantel. 2000. *The Democratic Paradox*. London/New York: Verso.

Oreskes, Naomi. 2004. "The Scientific Consensus on Climate Change." *Science* 306: 1686.

Pielke Jr., Roger. 2013. "Have the Climate Sceptics Really Won?" *The Guardian* online, May 24, www.guardian.co.uk/science/political-science/2013/may/24/climate-sceptics-winning-science-policy

2 Ecologizing Experimentations

A Method and Manifesto for Composing a Post-humanist Museum

Fiona R. Cameron

RETHINKING THE MODERN FORM OF THE MUSEUM

Urgent action is required to produce knowledge and cognitive frames that will give rise to new ways of thinking and acting to promote a livable planet for the long term. Such action requires innovation across all disciplines and sectors. It also demands we engage afresh with familiar established concepts and constructions.

Museums are one of modernity's most emblematic and trusted pedagogical institutions. Recognized as icons of modern humanism and Cartesian rationality, museums are instrumental in shaping visions of the world, of culture and cultural difference, human relations with nature, technology and science. Their philosophies and representational practices continue to endorse and disseminate a modern worldview. In the context of the current ecological crisis this worldview is seen as increasingly problematic. In order to promote a viable future we must dissolve familiar, modernist dualisms such as "nature" and "culture," "human" and "nonhuman," "social" and "natural" (Latour 1993) and view the world as entangled, dynamic socio-biological systems.

This chapter has the specific goal of tackling the problem of promoting sustainability by suggesting ways we can rethink the modern form of the museum and its humanist philosophy. I aim to first outline the relational logics informing modern thinking through a discussion of museum practices and narratives founded on Cartesian dualisms (Mind/body; Culture/nature; Human/object; Self/other; Real/virtual) and then rework some examples according to post-human ways of thinking that signal a new post-Cartesian, more-than-human approach to the make-up and composition of the world. To achieve this I explore and re-story the relationships that hold the modern world together, using the museum as a case study. The aim is to gesture toward new ways to represent, talk about humans, nonhumans, culture and cultural diversity, heritage objects, the environment and climate change as new types of narratives, sets of practices and concepts. In doing so I will signal ways we might better promote respect for various forms of animate and inanimate things, nourish new forms of interspecies connections,

intercultural relations, social inclusiveness and interaction that is better able to regard humanity as part of a larger, dynamic living system (see Domanska 2010). While I acknowledge that Cartesianism is the foundation of modernity and that our anthropocentric disposition can never be superseded, my aim is to problematize and untie the double knot of Cartesian dualism and substance metaphysics (the mind as immaterial and things as material) and to offer some alternative concepts and practices.

CARTESIAN RATIONALITIES AND DUALISTIC PRINCIPLES

Cartesian rationality refers to a series of conceptual and practical divides between mind and body, human and object, nature and culture, and self and other, formulated by French philosopher Réne Descartes (1641, 2009) on the basis of a division between the Mind/soul and the body. This division subsequently set up a humanist philosophy and a dualistic metaphysics where the world came to be thought of as two distinct and different substances: immaterial, mental things (human minds, ideas) and material things (matter and bodies). These divides have become entrenched and identified with Western enlightenment thought and rational thinking. Moreover, this logic became a habitus (set of values and practices) used by modern Western society to establish its own vision of the world; a standard to judge and subjugate others, both human and nonhuman; and a classificatory schema to act in the world (Descola 2013, 88; Secada 2000) despite its inherent structural problems as raised by philosophers such as Spinoza (see Curley 1985; Morgan 2002), Leibnitz (1695/1890), Kant (1781/1999), Hegel (1807/1977), Grosholz (1991) and Schmaltz (2005). The anomalies inherent in this dualistic schema are most strikingly illustrated through the paradox of the human animal. Spinoza argued against the division of the mind and body and saw humans as part of nature (see Morgan 2002). His work represented an early form of monism as an alternative to Cartesian dualism where all things were seen as comprising the same substance and essence.

Swedish natural scientist Carl Linnaeus (1735/1914) and German physician Johann Blumenbach (1776) re-enforced Cartesian divisions through taxonomic schemes that sought respectively to classify all life on Earth and organize human species into races according to their physical similarities and differences with each separating humans from other animals due to their assumed distinctive capacity for objective thought (Ingold 2011). The consequences of this logic, its differentiating principles and practices based on the notion of humans as thinking things and everything else as non-thinking material things has been profound. Cartesianism led to the formation of a modern human-centric world known as modern humanism where everything was organized according to the criteria and needs of modern subjects. The theory of the mind (intellect, consciousness, reason, subjectivity, moral

conscience) became emblematic of humanity where the modern individual was placed above other people, beings and things. These "othering" distinctions between animals and humans placed limits on and framed particular relations with them. Humans became distributed into social collectives (culture) that excluded nonhumans from civic life. The structure and properties of human social collectives became pluralized and variable according to the subjectivity of their minds and perceived moral capacities (Descola 2013). Differences between people were indexed developmentally according to cultural traits such as institutions, material culture and psychology. Cartesian rationality presented itself as a universal disposition used to objectify all domains of practice. Disciplinary divisions set up the separate domains of the natural (biology, physics) and human sciences (anthropology, ethnology, psychology, history, philosophy); the former to reveal universal laws of material/physical substances and the latter theories of the mind and culture where agency was seen as exclusively human. These one-world disciplinary perspectives failed to adequately reference local concepts and the varied beliefs, institutions and values of others (Descola 2013, 189).

Cartesianism therefore prefigured a particular type of social collective that was contrastive, hubristic and based on unequal relations between humans and nonhumans (where the former was able to speak for, control and exploit nature), and between humans where progressive and differencing logics promoted discourses of separateness and inequity such as class and gender, and social categories of difference such as cultural diversity and multiculturalism. More recent postmodern thinking rather than a radical reworking of modern dualistic principles is yet another Cartesian, anthropocentric worldview promoting the notion of the human and culture as the center of all things, and pluralism and difference as organizing principles. Accordingly, intersubjectivity is impossible to achieve between humans and nonhumans because of these irreconcilable dualisms, and difficult to achieve between humans because of the domination of Cartesian worldviews (Descola 2013).

The modern museum form based on hierarchical and dualistic principles is, however, inadequate in its ability to deal with climate change because it fails to acknowledge the entanglements between human and nonhuman actants and therefore is unable to produce the kind of knowledge and cognitive frames necessary to deal with the messy and complex environmental problems currently facing the world.

THE MUSEUM AND CARTESIAN INFLUENCES

In sixteenth and seventeenth century, pre-modern Renaissance cabinets of curiosities across Europe comprised assemblages of strange and wondrous objects that resisted categories of classification and display (Hooper-Greenhill 1992). In these displays the boundaries between nature and culture, history

and science, and mind and body were fluid and interchangeable (Hooper-Greenhill 1992).

In the Anglophone world the Ashmolean Museum, Oxford (1683), the British Museum and Natural History Museum was established in 1759 at a formative point in the development of the natural and human sciences (Foucault 1970). At that juncture nature and culture became organized into distinct, independent realms. The Cartesian Human/object distinction for the classification and analysis of collections and a reliance on vision as a method of observation used in classificatory procedures set up new relations with the world that conceptually disavowed entangled interactions between nature and culture.

The practices of collecting, documenting and exhibiting advanced in tandem with the development of Cartesian thinking. Organized according to dual distinctions of nature and culture and influenced by the taxonomic schemes of Swedish natural scientist Carl Linnaeus (1735), museums across western Europe mobilized new natural and cultural identities for humans and nonhumans through the collection and classification of representative natural and cultural objects, made possible by the discrimination between things on the basis of their physical similarities and differences (Foucault 1970, 71).

Curatorial exhibition, collecting, documentation methods and practices are still characterized by unrelenting dualisms and substance metaphysics with their corresponding sense of a subjective mastery over nature; the ordering of cultures as a series of plural, distinct cultural identities; and through museum modes of visual ordering and classification in which audiences are prefigured as individual reasoning and moral subjects (Bennett 1995; Cameron 2007).

The Natural History Museum, London (Thackray and Press 2013) is an example of the ongoing operation of these doxas. Merchandise claims "We are on Nature's side," references to "Nature's treasure house" and "temple to Nature" present the museum as an inventory of nature as a domain separate from humans with authority to speak for the nonhuman (see Cameron, this volume, for an expanded discussion). Rooms are devoted to different kingdoms of Nature from Dinosaurs to Birds and Creepy Crawlies to Minerals (Thackray and Press 2013). Exhibitions are devoid of humans except to illustrate their bodily characteristics and shared physical form with other primates. Nature is represented in the Science and Life Galleries in the exhibitions *Dramatic Earth* and *Bugs Alive,* and the human as a subject through the workings of the *Mind* and as a human species in the *Human Body* exhibition. At the Darwin Centre, the Museum's collections and research facility, the human subject and object dualism continues to operate where specimens are collected, studied by curators and classified according to their physical attributes and presented as objective facts (Genoways and Andrei 2008; Hooper Greenhill 1992; Thackray and Press 2013; Weil 1995). The museum's emphasis on the display of their

collections according to scholarly frameworks continues to frame visitors' learning experiences according to the Human/object dualism (Parry 2010; Macleod et al. 2012). Cartesian substance dualisms continue to shape collections as evident in debates around the status of the digital "immaterial" as opposed to superior "material" objects (Cameron 2007). The exhibitions *Atmosphere* (Science Museum, London), *Climate Change Wall* (Natural History Museum, London), *Ecologic* (Powerhouse Museum, Sydney) and *Dynamic Earth* (Melbourne Museum, Melbourne) presents the atmosphere as an object for human intervention rather than as an entangled socio-biophysical system (Cameron 2012; Cameron 2014, this volume). Recent scholarship on German museums traces the role of the mind as an organizing principle in museum collecting practices (McIsaac 2007). At the Deutsches Museum (German Museum of Science and Technology) many exhibitions are divided by disciplinary divisions of science that seek to illustrate universal laws of the physical world. Even more recent attempts to theorize museums by "the new museology" remain human-centered. Begun in the 1970s and gathering momentum in the 1980s, the "new museology" was founded on postmodern principles of cultural pluralism and subjectivity and a sociological approach to museum philosophy and practice. These concerns were made tangible through practices that sought to foreground the social roles and purposes of museums in society and the politics of representation in exhibitions and collecting as opposed to an earlier preoccupation with museum methods (Cameron 1972; Henning 2006; Vergo 1989). While institutions are placing a new focus on practices of cultural pluralism, cultural representation, community development and education they continue to uphold the assumption that the human is the center of all things and that human societies are naturally divided into a limited number of non-interacting categories based on ethnic and cultural identification, where difference is equated as a disparity of worldviews. In doing so, museum practices continue to uphold the notion of institutions as differencing machines, first as sites for the hierarchical ordering of differences and the formation of ranked social collectives to the use of collections to act on the relations between different ethnically diverse communities (Bennett 2006). These assumptions are evident in the new media program *Talking Difference* at the Immigration Museum (Museum Victoria). Through social media, young people from diverse ethnic and cultural backgrounds were encouraged to talk about cultural difference and what it means to them for the purposes of promoting respect and tolerance for cultural diversity.

THE CARTESIAN PROBLEMATIC

In a world increasingly characterized by global interdependencies and entanglements of many components and aspects of sociopolitical and

biophysical systems, and in the context of messy problems such as climate change and the global financial crisis (see Ang 2011; Urry 2003) rigid, fixed and obsolete structures of analysis based on the modern constitution, its human centered theology and Cartesian dualisms are increasingly problematic.

Today the limitations of Cartesianism, its dualistic logics and human-centered epistemology, is acknowledged in many disciplines. Within the fields of neuroscience and the neuro-humanities new discourses promote the idea of minds as socio-biophysical phenomena (Stafford 2011). In quantum physics, matter is seen as having a proto-consciousness (Barad 2007). Within the humanities entrenched epistemological approaches that privilege one-world knowledge practices are under review by a number of scholars and replaced for example by complexity theorist John Law's (2011) "fractiverses" and Isabelle Stenger's (2010) "cosmopolitics." In Donna Haraway's (2007) work, *When Species Meet,* she explores the philosophical, cultural and biological aspects of animal–human encounters and proposes new types of communions between human and nonhuman species.

The current ecological crisis originated from modern industrial and fossil fuel–burning practices and styles of thought based on Culture/nature dualistic and hubristic doctrines. It has also become apparent that we can no longer rely on these modern explanations, solutions and Cartesian styles of thought and practices based on "big Nature," Culture/nature dualisms, hubristic doctrines and the exploitation of the environment (Bingham and Hinchiffe 2008, 64; Latour 1993, 2013; Swyngedouw 2010) for thinking and acting on climate change. Taking apart modern humanism, cultural geographers Lesley Head and Chris Gibson (2012, 703) suggest, is the first step toward "forcing us to reconsider what the constituent practices and solutions might be."

NEW KNOWLEDGE PRACTICES AND THE RELATIONAL PARADIGM

New knowledge practices are emerging in the humanities and social sciences aimed at comprehending and formulating culturally intelligent ways to rework Cartesian dualisms and metaphysics, and anthropocentric social collectives, in ways that are better able to deal with the complexities of the contemporary world and the climate crisis. These shifts represent a move from modern epistemology that sought to produce knowledge that could represent the empirical world to ontology, a practice that seeks to address more directly the composition and dynamical "enaction" of the world (Woolgar and Lezaun 2013). These new ontologies, defined broadly as relational and processual, reject substance and cultural dualisms and collectively claim that all things human and nonhuman are relationally connected

as part of one dynamic system (Bennett 2010; Castree 2003, 2012; Clark 2011; deLanda 2006; Deleuze and Guattari 1987; Haraway 2007; Harvey 2007; Hodder 2012; Latour 1993; Morton 2010; Thrift 2007). These dynamic systems are conceptualized differently by the various authors. For all these authors humans and minds are folded into material processes, the interactions between all these elements, however, are animated in various ways and through various means (Barad 2007; Bennett 2010; deLanda 2006; Deleuze and Guattari 1987; Morton 2010). Each proposal decenters and repositions the human in new social collectives that invite previously invisible nonhuman others into civic life (Ingold 2011; Latour 2004, 2013). Agency is no longer restricted to the human mind and intentionality instead is seen as contingent and emergent within new social collectives (Bennett 2010; Hodder 2012). New scholarship exploring interspecies relations and communication (Haraway 2007) breaks the notion of human exceptionalism and explores the relations and dependencies between animals and humans while recognizing the creative capacity for novel interactions among human and nonhuman agents. Drawing on indigenous perspectivism and animism, scholars in the West are seeking to establish a new ethics of care that engenders respect for other things, plants and animals through the attribution of personhood to nonhumans, and by inducting them into civic life as part of an interrelated social system (Harvey 2007). Embodiment as a research field uses phenomenological, cognitive and aesthetic modes of enquiry to understand learning and break the Mind/matter and Human/object dualisms by envisioning human experience and knowledge formation as dynamically unfolding interactions with the environment (Hutto and Myin 2013; Noë, 2012). The emergence of the idea of the Anthropocene also breaks the Culture/nature dualism framing humans as entangled with nature and embedded in the recent geological record (Crutzen 2002).

Museums are today entangled in many mobile, intertwined and heterogeneous forces, embedded in many systems, organizations, processes and social, cultural and environmental problems and geopolitical conflicts that necessarily predispose many different types of material, social, human-human and nonhuman processes and relations. The increasingly complex nature of the contemporary world as described and the place of institutions within these dynamic processes gestures toward the need for different museum ontologies and practices that can acknowledge and work with these complex ecologies and produce knowledge and pedagogical experiences that can engender new concepts of social interaction and engender respect for various forms of life and inanimate things. The promotion of such ontologies in the space of the museum as new types of knowledge practices and worldviews will contribute to collective global efforts to progress real world and scholarly change that can have greater leverage in the long run to sustain the continuation of the species and a livable planet.

RECENT DEVELOPMENTS IN MUSEUM SCHOLARSHIP

An emerging body of scholarship in heritage and museum studies is gesturing toward the use of relational ontologies to understand museums as networked institutions (Gosden and Larsen 2007); to see collections and institutions as complex, networked processes and as socio-material assemblages (Bennett 2009; Cameron 2010). New dialogic models for heritage interpretation drawing on indigenous perspectivism and post-humanist debates is being used to frame new strategies for managing heritage sites and collections (Harrison 2013). The perspectives of new materialisms and assemblage theory has been used to frame alternative notions of the digital and material (Cameron and Mengler In press) in respect to museum collections that break substance and Human/object dualisms. New research and the building of novel immersive and embodied interfaces allow for entangled, mediated and symmetrical relationships to emerge for audiences thus breaking the Mind/body dualism (Kenderdine 2013a; 2013b). While museums have an important role to play in respect to environmental issues such as climate change and biodiversity loss (Janes 2009), I concur that institutions are hampered in addressing such issues in an effective way because of the dualistic logics that underpin institutional practices. Institutions also struggle to deal with others who don't share their Cartesian worldview and aspirations. While the critique of Cartesian thinking in museum practice is progressing in terms of experiences of embodiment and affect in respect to learning (Alsop 2005), much work is yet to be done to make museum theory and practice more relevant for the present-day and for promoting new styles of thought and action.

To critically engage with, extend approaches for progressing real world and scholarly change and to respond to Head and Gibson's call to frame new constituent practices for thinking otherwise in the world, I propose to undertake what I call a series of "ecologizing experimentations." My ecologizing experimentations aim to consider new ways of handling all the objects of the human and nonhuman as part of a complex, entangled life (see Latour 1998) within the museum by exploring the potential for reworking the possible relations between things and people as new types of museum narratives and practices. The theoretical coordinates I draw upon for framing these "ecologizing experimentations" are derived from anthropologist Bruno Latour's (1993; 1998; 2013) notion of "ecologize." For Latour (1998, 22) "ecologizing" as opposed to our previous preoccupation with "modernizing" is a new political project that seeks to form new notions of the social by specifying that natural and social entities are bound together in complex interrelations, and that relational and ecological principles bear on every type of connection. While Latour (1998, 22) proposes his "ecologizing" project as one that creates the necessary procedures that make it possible to follow a network of quasi objects (hybrid human and nonhuman things), I seek to broaden the term "ecologize" to include other

proposals that take account of complexity and introduce post-human and non-Western perspectives into the analytical mix. I take my methodological reference from anthropologist Phillippe Descola (2013, 92), who suggests that, in order to build a world across Cartesian boundaries, we need to first envisage the modern mindset and its idea of the human and the social from the point of view of the relations that hold it together. I work with both approaches to illustrate the ways Cartesian philosophies are structured within the context of the museum and to critically interrogate post-human ontologies and the multifarious ways the human and the social is framed and can potentially be reframed according to different types of relational connections. Latour's (2010) idea of composition is referenced as a way to think about how we might compose different museum worlds, in respect to alternative ways we can entangle ourselves with places, nonhumans, technologies and the material world. The urgency and significance of this ecologizing work for the museum arises from a global imperative across the humanities and social sciences to produce new cognitive frames better able to deal with the environmental challenges humanity currently faces.

FRAMING A NEW ETHNO-THEORETICAL METHOD FOR CONDUCTING "ECOLOGIZING EXPERIMENTATIONS"

In order to frame a new ethno-theoretical method for conducting my "ecologizing experimentations," I use Latour's (1998; 2013) distinctions between "modernizing" and "ecologizing" projects, and use the museum as an operational field to explore how things are combined together and classified in different ways according to the modes of identification that mobilize them. Conceptually, I frame this investigation according to Descola's (2013, 112–113) logics: "identification" and "relations." Descola (2013) uses identification to ascertain the terms assigned to an object through classificatory and ontological categories by different cultural groups and then uses relation to ascertain the type of relationships the object enters into with others as particular types of world-making once assigned an identification. My first move therefore is to utilize "identification" as a lever to understand the variable ways Cartesian dualisms are made manifest in museums as a series of terms, classificatory mechanisms and practices, and how these terms define a specific style of relations with the world through the discontinuities and continuities established between self, other existing beings and things through the inference of analogies and contrasts, and through the attribution of properties (Descola 2013). My second move is to interrogate the concept of "relationship," to investigate the sets of norms, and classificatory mechanisms governing the relationships between beings and things within the museum. This includes the types of subjects (human or otherwise) and humanisms produced; the types and organization of social collectives and their dominant regimes of knowledge and action; the types

of identities and otherness that are established and how these relationships are expressed figuratively within the context of the museum and through practices. I mobilize the concept of "relation" to critique and ascertain what the museum has and could gain or lose in collapsing distinctions between things and ecologizing. I then investigate how practices might be refashioned through the blending of different post-human ontologies and how each might contribute to the development of new museum institutional ontologies, narratives and notions of the object. I also consider the development of new ecologizing principles specifically for museum contexts and the ways we might deploy this thinking to compose different post-humanisms, styles of relations with the world, different social collectives and identities and inter-relations between human and human and nonhuman.

To illustrate how this ecologizing process might work, I will first discuss the notion of the museum as an institution in its modern form and detail its reworking as the liquid museum on the basis of ecologizing principles drawing on cultural theorist Zygmund Bauman's (2000; 2007) liquid modernity, Gilles Deleuze and Felix Guattari (1987) and Manuel DeLanda's (2006) assemblages, and political theorist Jane Bennett (2010) and Diane Coole and Samantha Frost's (2010) new materialisms (see Cameron 2010; 2012; 2014). My ecologizing experimentation in respect to the modern museum is a theoretical, conceptual and experimental exercise that has the specific objective to influence the pragmatic refashioning of institutions by museum professionals in ways I believe will enable institutions to operate more meaningfully in climate change governance and in respect to other difficult issues.

The museum is established on modes of identification founded on substance dualisms: material (things) and the immaterial (human minds, ideas and scholarship). Institutions are defined as finite material things (e.g., a physical building; bodies; computers; exhibitions, collections; geographical location; stakeholders, funding), and mind, thoughts, concepts and scholarship (e.g., research; institutional mission; expressions of legitimacy; expertise; trust; authority, aspirations; contracts; procedures, beliefs and brands). Museums house natural and cultural collections as material things where curatorial expertise, and scholarship mediated through the mind and conceptual frameworks is then brought to bear on them to categorize and describe them on the basis of a unique Human subject/object relation. Human concerns are the center of all these activities. Curators and scientists give themselves the authority to speak and define the nonhuman world.

The dominant image of museums as an organization is one of hierarchy, considered as a whole composed of parts hierarchically organized and operating together according to a centralized plan. That is, as an enclosed space, as a solid, fixed entity, analyzed as an apparatus in the service of a particular political rationality, and in scholarly terms accorded a habitualized ordering of the social (e.g., knowledge/power; discipline and disciplinary effects; sign and interpretation; subject and subjectification).

Bauman's (2000, 2007) liquidity frame enables us to conceptually refashion institutions from predominant modern forms of identification as hierarchical, closed, and fixed to a physical location. Institutional structures and forms are instead, according to liquidity theory replaced with soft power, porous borders, heterogeneous practices that are distributed, light, fluid, mobile, contingent, unpredictable and emergent. While the liquidity concept is not strictly an ecologizing principle because it does not revise the modern dualistic paradigm, it goes some way to considering how we might conceptualize ways institutions might operate within the fluid, turbulent and complex globalizing world. Most importantly however, liquidity disrupts the stolid and solid imaginary of the modern museum and its hard, disciplinary, authoritative powers and reformatory agenda. Plural power theory (Bauman 1991) reworked as a complexity practice operates as a means for reassembling museums within governing arrangements as coalitions involving multiple stakeholders, each with different agentive capacities, opinions, values, expertise and different rationalities, technologies and techniques for acting.

Deleuze and Guattari (1987) and DeLanda's (2006) notion of assemblage is an ecologizing concept that I use to refashion the relations between the different elements that make up the museum and with other entities outside of the institution. This approach refashions institutions conceptually on the basis of relational concepts that enable museum professionals to pragmatically frame museums as dispersed as well as interconnected, as mobile and emergent, operating within the pluralized governmental arrangements and rationalities, deploying different technologies and techniques for governing climate change. Replacing existing museum institutions as separate, static material and immaterial elements comprising buildings, bodies, climate change narratives, collections, authority, trust and research with assemblages as processes, new relational connections are created between all these things as affected and affecting bodies, where actions and discursive elements, both actual and virtual, are folded together. In doing so the museum institution becomes an emergent collective operating in dynamic gathering or assembling and disassembling processes that are multi- and inter-scalar, crossing sectors, scales and transnational boundaries.

Proposals collectively described as the new materialisms (e.g. Bennett 2010; Coole and Frost 2010) are ecologizing concepts that have the potential to frame new and dynamic relational connections between human and nonhuman actants and assemble them together as socio-material processes as more-than-human social collectives. Institutions are therefore conceived as extended entities, folded into all manner of material processes, and as new types of collectives made up of affecting and affected inanimate, organic, inorganic and animate things. The different positioning of the nonhuman and material processes in the museum assemblage adjudicates time-honored interventions that are centered around human-centric views, opinions and actions as the sole institutional focus. Because agency is distributed across

and through these polities, the museum assemblage functions as a federation of actants (Bennett 2010, 23) in which material and nonmaterial things comprise the institution. Reassembling the museum as comprising entangled material intensities and potencies that have the power to affect and be affected by others in dynamic interactions can therefore frame institutions as creative and productive forces.

These entangled confederations of human, nonhuman and virtual elements have the propensity to enact distinctive capacities, agencies or efficacious powers within and across a number of assemblages that can be, at times, uncoordinated.

Museums can enhance their effectivity as a distributed agency by operating within multiple aggregations deploying their own resources (expertise in science, communication, legitimacy, trust, authority and branding, buildings, collections, exhibitions and networks) in many and varied ways, conjointly. In a complex relational, agentive and entangled world, the boundaries of the museum are hard to define due to the many connecting elements, which are both visible and invisible. To be sure, each of the institution's material and expressive forms extend beyond what we can call the organization of the museum. The museum's expertise, for example, can be concatenated with a whole range of other assemblages such as science research and policy aimed at reducing greenhouse gas concentrations through biopolitical compliance in a context where greenhouse gases continue to rise.

The notion of the liquid museum as an assemblage for both implementing museum programs and for analysis in contrast refers to its form and operation as a process of networks of aligned, entangled interests; relational connections; and as intensities of energies and things that cohere and move apart, therefore as emergent forms. An example of how a liquid museum might operate in a real world ecological context is illustrated in Mauricio Corbalan's interlude, "How the Open Web Performs Socio-environmental Crisis" (this volume). Using an open web ecosystem to conduct socio-environmental conflicts and to monitor polluting practices in the Riachuelo River basin, Buenos Aires, m7red.org gathered together a network of scientific experts, local communities, media and NGOs to develop a collective knowledge base for making decisions on how to manage the ecological crisis. The open web platform operated as an assemblage drawing together different actors, capacities and knowledge practices as networks of aligned, entangled interests for collective decision making. While this collective did not involve a museum it gestures toward ways institutions might operate as a liquid, distributed network with specific types of expertise can be mobilized to contribute to these contested and emergent decision-making processes.

The proposals of Deleuze and Guattari, Coole and Frost, and Bennett, each seek to break the Cartesian dualisms of Human subject/object, Culture/nature and Mind/matter. These incursions challenge the museum's mandate to represent a hubristic consensual view, a common world seen through

the lens of modernity in which the modern human on one hand is separate from material processes and on the other classifies, orders, commands and controls nature. Rather, institutions must instead see and present a world as one enmeshed in and shared with many human and nonhuman entities. In using the idea of the materialization of the human and discourse, an idea that gives agency to an array of things, institutions are no longer conceptualized as solely anthropocentric social and cultural entities but also as material processes. Such changes will involve acknowledging the foundations of the modernist mindset and the reworking of the rules of practice associated with a modernist museology that operates in many areas of science and museum practice, such as classification, the desire to represent the world, the objectification of things such as the atmosphere and greenhouse gases as a precept for action as well as forms of authority associated with all these methods. The other challenge is the necessity to shift institutional attitudes, principles and protocols. How can staff reconcile intangible, fluid formulations of the museum as an organization with its modernist conception as a concrete hierarchical entity? Such a mind-change involves a shift from a co-relational view based on the museum as an entity in causal, complementary, parallel or reciprocal relationships with others to one as a relational entity—as part of collectives in which actants, both human and nonhuman, combine in emergent processes (see Hernes 2009). Equally, it involves a shift in the modernist museum mindset from a world of facts and categorizations to a fluid world of processes. Relationality as connectedness, according to Hernes (2009, 129), "implies bringing together things to form a basis from which action can take place." The museum emerges as a fluid entity in collectives actively making connections between things, and as a subject of unintended consequences.

CONCLUSIONS

As I have illustrated with the liquid museum experiment, the application of ecologizing principles to museum practices and narratives has the potential to dissolve dualistic, hierarchical and imperialistic humanisms and their inequitable divisions of culture and nature; human and nonhuman; self and other; mind and body; human and object; real and virtual. An ecologizing logic also breaks the idea of the existence of one-world ontologies and knowledge practices; the privileging of human intentionality and concepts of time and change as knowable, linear and progressive.

I would like to suggest ways we might ecologize other museum concepts and practices to break the stranglehold of modern humanism. To do this I propose to work closely with theory to ascertain how we might connect entities in collectives; formulate inter-relations between humans and humans and nonhumans; found new formulations of history and change; propose new concepts for objects and collections, including those defined as virtual,

and how multiple worldviews might exist and interact in a context where one-world ontologies no longer exist. My objective is to set up new forms of more-than-human civic life that have the potential to be made manifest in museum practices and narratives that invite nonhuman others into social collectives, acknowledges and is more respectful of the diversity of forms and modes of thought and ontological categories.

Ecologizing experimentations on natural history collections and exhibition narratives has the broadest potential to rework human-focused and hubristic perceptions of the world; build new social collectives that can acknowledge and work with the inter- and complementary relations between humans and nonhumans; and promote concepts of social inclusiveness and an ethics of care *beyond the human world* (e.g., Descola 2013, 11; Harvey 2007) as a new position from which interspecies transactions can be made. Nigel Helyer and Mary-Anne Lea's interlude, "Under the IceCap" (this volume) illustrates how museums might compose new, entangled relations and communions between humans, nonhumans and the environment in museum programming. Complex bio-logging data-sets gathered from southern elephant seals on their Antarctic under-ice dives and ocean transits was combined with economic and climatic data to produce music and sound sculptures generated in direct response to these data sets and maps as a means to encode the structures of the Southern Ocean.

Ecologizing climate change and environment experimentations can be used to direct us to ways we might break modern human-centered views on climate change and the environment; to gesture toward ways we might collapse and individuate modern nature into an array of coordinates, some of whom were previously invisible; to rework relations between things as natural-cultural hybrids and fold the human and nonhuman into dynamic, nonlinear and complex systems (e.g., Deleuze and Guattari 1987; Latour 1993; Urry 2003; see Cameron 2014, this volume). These ontologies also gesture to ways linear notions of cause and effect inherent in mitigation and stabilization narratives can be reworked as nonlinear complex systems involving the actions and agencies of many human, nonhuman, technological actors and earthly processes. Ecologizing work in respect to Human subject/object distinctions in collecting and documentation can be used to formulate new concepts for material culture and the digital as heterogeneous, socio-material assemblages (Cameron 2010, 2014); rework objects as vibrant as opposed to static objective things (e.g., Bennett 2010; Coole and Frost 2010) and as part of more diverse, dynamic social collectives and extended networks (Hodder 2012). Rather than seeing cultural diversity in collections records and narratives of community as plural, cultural expressions set against the backdrop of a one-world view and one nature, multinaturalism (e.g., Viveiros de Castro 2005) can be used to rework cultural diversity as a diversity of natures and entities that include nonhuman others, thus breaking the Culture/nature and Self/other division. Ecologizing principles can also be directed to ways we might revise Cartesian one-world

ontologies and replace them with concepts that allow institutional staff to compose multiple, divergent worlds (e.g., Latour 2004; Law 2011; Stengers 2010, 994), negotiate different realities and co-produce shared worlds through documentation practices and exhibition narratives between different groups within the museum. Such ecologizing experimentations can thereby provide an empirical and theoretical case to support the argument that post-Cartesian museums or museum projects can, through the recognition of more-than-human social collectives, and the blending of different ontologies, together make an important contribution to producing knowledge that can promote long-term sustainability discourses and strategies for action.

REFERENCES

Alsop, Steve, ed. 2005. *Beyond Cartesian Dualism: Encountering Affect in the Teaching and Learning*. Dordrecht, Netherlands: Springer.

Ang, Ien. 2011. "Navigating Complexity: From Cultural Critique to Cultural Intelligence." *Continuum: Journal of Media and Cultural Studies* 25(6): 779–794.

Barad, Karen. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.

Bauman, Zygmund. 1991. *Modernity and Ambivalence*. Ithaca, NY: Cornell University Press.

Bauman, Zygmund. 2000. *Liquid Modernity*. Cambridge: Polity.

Bauman, Zygmund. 2007. *Liquid Times: Living in an Age of Uncertainty*. Cambridge: Polity.

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bennett, Tony. 1995. *The Birth of the Museum: History, Science, Politics*. London: Routledge.

Bennett, Tony. 2006. "Exhibition, Difference and the Logic of Culture." In *Museum Frictions: Public Cultures/Global Transformations,* edited by Ivan Karp and Corinne Kratz, 46–69. Durham, NC: Duke University Press.

Bennett, Tony. 2009. "Museum, Field, Colony: Colonial Governmentality and the Circulation of Reference." *Journal of Cultural Economy* 2(1–2): 99–116.

Bennett, Tony. 2010. "Making and Mobilising Worlds: Assembling and Governing the Other." In *Material Powers: Cultural Studies, History and the Material Turn,* edited by Tony Bennett and Patrick Joyce, 188–208. London: Routledge.

Bingham, Neil and Steve Hinchliffe. 2008. "Reconstituting Natures: Articulating other Modes of Living Together." *Geoforum* 39(1): 83–87.

Blumenbach, Johann, F. 1776, 1865. *On the Natural Variety of Mankind*. www.blumenbach.info/_/De_Generis_humani_1st_Ed.html

Cameron, Duncan F. 1972. "The Museum, a Temple or a Forum." *Curator* 4(1): 11–24.

Cameron, Fiona R. 2007. "Beyond the Cult of the Replicant, Museums, Objects—New Discourses—Traditional Concerns." *Theorizing Digital Cultural Heritage: A Critical Discourse,* edited by Fiona R. Cameron and Sarah B. Kenderdine, 49–77. Cambridge, MA: MIT Press.

Cameron, Fiona R. 2007. "Moral Lessons and Reforming Agendas: History, Science Museums, Contentious Topics and Contemporary Societies." In *Museum*

Revolutions, edited by Simon Knell, Suzanne Macleod and Shelia Watson, 330–342. London: Routledge.

Cameron, Fiona R. 2010. "Liquid Governmentalities, Liquid Museums and the Climate Crisis." In *Hot Topics, Public Culture, Museums*, edited by Fiona R. Cameron and Lynda Kelly, 112–128. Newcastle-upon-Tyne, UK: Cambridge Scholars.

Cameron, Fiona R. 2012. "Climate Change, Agencies, and the Museum for a Complex World." *Museum Management and Curatorship* 27(4): 317–339.

Cameron, Fiona R. In press. "The Liquid Museum: New Ontologies for a Climate Changed World." In *Museum Theory: An Expanded Field,* edited by Andrea Witcomb and Kylie Message. UK Blackwell.

Cameron, Fiona R. and Sarah Mengler. In press. "Transvisuality, Geopolitics, the Museum and the Death of the Virtual Terrorist." In *Transvisuality: Dimensioning the Visual,* edited by Anders Michelsen, Frauke Wiegand and Tore Kristensen Liverpool: Liverpool University Press.

Castree, Neil. 2003. "Environmental Issues: Relational Ontologies and Hybrid Politics." *Progress in Human Geography* 27(2): 203–211.

Castree, Neil. 2012. "The Return of Nature?" *Cultural Geographies* 19(4): 547–552.

Clark, Nigel. 2011. *Inhuman Nature: Sociable Life on a Dynamic Planet*. London: Sage.

Coole, Diana and Samantha Frost. 2010. *New Materialisms: Ontology, Agency and Politics*. Durham, NC: Duke University Press.

Crutzen, Paul. 2002. "Geology of Mankind." *Nature* 415: 23.

Curley, Edwin, ed. 1985. *The Collected Works of Spinoza, Volume I*. Princeton, NJ: Princeton University Press.

deLanda, Manuel. 2006. *A New Philosophy of Society: Assemblage Theory and Social Complexity.* London: Continuum.

Deleuze, Giles and Félix Guattari. 1987. *A Thousand Plateaus*. Minneapolis: University of Minnesota Press.

Descola, Phillippe. 2013. *Beyond Nature and Culture*. Chicago: University of Chicago Press.

Descartes, Réne. 1641, 2009. *Meditations on First Philosophy in which the Existence of God and the Immortality of the Soul are demonstrated*. New York: Classic Books.

Domanska, Ewa. 2010. "Beyond Anthropocentrism in Historical Studies." *Historein* 10: 118–130.

Foucault, Michel. 1970. *The Order of Things: An Archaeology of the Human Sciences*. New York: Pantheon.

Gosden, Chris and Frances Larson. 2007. *Knowing Things: Exploring the Collections at the Pitt Rivers Museum 1884–1945*. Oxford: Oxford University Press.

Genoways Hugh and Mary Anne Andrei. 2008. *Museum Origins: Readings in Early Museum History and Philosophy.* California: Left Coast. AuQ1

Grosholz, Emily 1991. *Cartesian Method and the Problem of Reduction*. Oxford: Oxford University Press.

Haraway, Donna. 2007. *When Species Meet*. Minneapolis: University of Minnesota Press.

Harrison, Rodney. 2013. *Heritage: Critical Approaches*. New York: Routledge.

Harvey, Graham. 2007. *Animism: Respecting the Living World*. New York: Columbia University Press.

Head, Lesley and Mark Gibson. 2012. "Becoming Differently Modern: Geographic Contributions to a Generative Climate Politics." *Progress in Human Geography* 36: 699–714.

Hegel, Georg Wilhelm Friedrich. 1807/1977. *Phenomenology of Spirit* (trans. Arthur. V. Miller). Oxford: Clarendon Press.

Henning, Michelle. 2006. "New Media." In *A Companion to Museum Studies,* edited by Sharon Macdonald, 302–318. Oxford: Blackwell.
Hernes, Tim. 2009. *Understanding Organisation as Process: Theory for a Tangled World*. UK: Taylor and Francis.
AuQ2
Hodder, Ian. 2012. *Entangled: An Archaeology of the Relationships between Humans and Things*. Malden, MA: Wiley-Blackwell.
Hooper-Greenhill, Eileen. 1992. *Museums and the Shaping of Knowledge*. London: Routledge.
Hutto, Daniel and Myin, Erik. 2013. *Radicalizing Enactivism: Basic Minds without Content*. Cambridge, MA: MIT Press.
Ingold, Tim. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge.
Janes, Robert. 2009. *Museums in a Troubled World: Renewal, Irrelevance or Collapse?* London: Routledge.
Kenderdine, Sarah. 2013a. *Place-Hampi: Inhabiting the Panoramic Imaginary of Vijayanagara*. Heidelberg: Kehrer Verlag.
Kenderdine, Sarah. 2013b. "Pure Land: Inhabiting the Mogao Caves at Dunhuang."
AuQ3
Curator: The Museum Journal 56(2): 199–118.
Kant, Immanuel. 1781/1999. *Critique of Pure Reason*. Indianapolis: Hackett Publishing.
Latour, Bruno. 1993. *We Have Never Been Modern* (trans. Catherine Porter). Hertfordshire, UK: Harvester Wheatsheaf.
Latour, Bruno. 1998. "To Modernise or Ecologize? That's the Question." In *Remaking Reality: Nature at the Millennium,* edited by Neil Castree and Bruce Willems-Braun, 221–242. London: Routledge.
Latour, Bruno. 2004. "Whose Cosmos, which Cosmopolitics?" *Common Knowledge* 10(3): 450–462.
Latour, Bruno. 2010. "An Attempt at a Compositionist Manifesto." *New Literary History* 41: 471–490.
Latour, B. 2013 *An Inquiry Into Modes of Existence*. Cambridge, MA: Harvard University Press.
Law, John. 2011. "What's Wrong with a One-World World." *Heterogeneities*. www.heterogeneities.net/publications/Law2011WhatsWrongWithAOneWorldWorld.pdf
Leibnitz, G.W. 1695/1890. "A New System of Nature and the Interaction of Substances as well as the Union that Exists between the Soul and the Body." In *The Philosophical Works of Leibnitz,* edited by G.M. Duncan, 69–70. New Haven, CT: Tuttle, Morehouse, Taylor.
Linnaeus, C. 1735/1914. *Systema Natura*. Amsterdam: Nieuwkoop and De Graaf.
Lumley, R., ed. 1988. *The Museum Time Machine: Putting Cultures on Display.* London: Routledge.
McIsaac, Peter M. 2007. *Museums of the Mind: German Modernity and the Dynamics of Collecting*. US: Pennsylvania State University Press.
AuQ4
MacLeod, Suzanne, Laura Houston Hanks and Jonathan Hale, eds. 2012. *Museum Making: Narratives, Architectures, Exhibitions*. London: Routledge.
Morgan, M.L., ed. 2002. *Spinoza: Complete Works*. Indianapolis: Hackett Publishing Company.
Morton, Timothy. 2010. *The Ecological Thought*. Cambridge, MA: Harvard University Press.
Noë, Alva. 2012. *Varieties of Presence*. Cambridge, MA: Harvard University Press.
Parry, Ross, ed. 2010. Museums in the Digital Age: Leicester Readers in Museum Studies. London: Routledge.
Schmaltz, T.M., ed. 2005. *Receptions of Descartes. Cartesianism and Anti-Cartesianism in Early Modern Europe*. New York: Routledge.

Secada, J. 2000. *Cartesian Metaphysics: The Scholastic Origins of Modern Philosophy.* Cambridge: Cambridge University Press.

Stafford, Barbara, ed. 2011. *A Field Guide to a New Meta-field: Bridging the Humanities-Neurosciences Divide*. Chicago: University of Chicago Press.

Stenger, Isabelle. 2010. *Cosmopolitics 1.* Minneapolis: University of Minnesota Press.

Swyngedouw, Eric. 2010. "Trouble with Nature—Ecology as the New Opium for the People." In *Conceptual Challenges for Planning Theory,* edited by J. Hillier and P. Farnham, 299–320. Surrey: Ashgate.

Thackray, John and Bob Press. 2013. *Nature's Treasure House: A History of the Natural History Museum*. London: Natural History Museum.

Thrift, Neil. 2007. *Non-Representational Theory.* London: Routledge.

Urry, John. 2003. *Global Complexity.* Cambridge, MA: Polity Press.

Weil, Stephen. 1995. *A Cabinet of Curiosities: Inquiries into Museums and Their Prospects*. Washington, DC: Smithsonian.

Woolgar, Steve and Javier Lezaun. 2013. "The Wrong Bin Bag: A Turn to Ontology." *Social Studies of Science* June 43: 321–340.

Vergo, Peter, ed. 1989. *The New Museology.* London: Reaktion Books.

Viveiros de Castro, Eduardo. 2005. "Perspective and Multi-naturalism in Indigenous America." In *The Land Within: Indigenous Territory and the Perception of the Environment,* edited by Alexandre Surrallés and Pedro García Hierro, 36–75. Copenhagen, Denmark: IWGIA.

3 Prospects for a Common World

Museums, Climate Change, Cosmopolitics

Ben Dibley

Writing in anticipation of the 2009 United Nations Climate Change Conference in Copenhagen and in the wake of the 2007 publication of the proceedings of the *International Panel on Climate Change,* Botany curator, Richard Hebda, contended:

> This report is nothing short of a wake-up call that humanity's course is unsustainable and has depleted not only the resources we use, but also impacted the very processes that sustain us and all other life on earth. Humanity is at a crossroad and museums have a vital role in helping people make informed decisions about which turn to take. (2007, 329)

In many ways Hebda's proposition is as compelling as COP 15's "road map" to a low emissions future proved to be disappointing. Nevertheless as persuasive as it is I think it is a proposition that demands pause for thought. This has less to do with the claim that museums ought to take up the challenge of climate change—without doubt this is vitally important and indeed in the interval since the publication of Hebda's article, many museological institutions have risen to the occasion.[1] Rather, it has more to do with the ways in which museums might come to do so. Central here, I contend, is the understanding of the nature of the relationship between the institution of the museum and the shared world that its pedagogy would seek to negotiate in the daunting task of making "informed decisions" about our impact on the "processes that sustain us and all other life on earth" (Hebda 2007, 329).

It is this relation between museums and the prospects of a shared world that is my concern here. The contention of this chapter is that these relations are regularly asserted through cosmopolitan appeals which are premised on the assumption that a cosmos, a world, a universe pre-exists its articulation; and, that it is the task of reason and of science, through the medium of a museum pedagogics, to adjust the citizen-subject to this already present condition. I argue that this is a flawed position because it assumes what, in fact, is required to be built: a world in common.[2]

In defense of this proposition I juxtapose two contrasting proposals by which the relation between museums and a common world might be explored: one cosmopolitan, the other cosmopolitical. The former is a term that invokes an extensive and nuanced literature to which this paper cannot do justice.[3] Rather, for my purposes here, focus is limited to relations between cosmopolitanism and global risk as they are formulated in the sociology of Ulrich Beck. Partly I do this because of the significance of his scholarship, and partly because of the utility of his arguments for the analysis of climate change (Beck 2010a; 2010b; also see Hulme 2010).[4] The latter, the cosmopolitical, concerns formulations from science studies, particularly those of Isabelle Stengers and Bruno Latour, which, while largely overlooked by the former literature, highlight, among other things, the anthropocentricism of cosmopolitan positions that fail to register the politics of the nonhuman through which a common world might be composed.[5] These two positions are programmatically advanced respectively in Beck's (1998; 1999, 1–18) "Cosmopolitan Manifesto" and Latour's (2010) "Compositionist Manifesto."

As an entry into these considerations I begin with two recent expressions of museum cosmopolitanism that have taken the form of declarations. The first, *Declaration on the Importance and Value of Universal Museums* (ICOM 2006) and its focus on the unity of the cultural heritage of humankind; and, the second, *The Buffon Declaration* (2007), which concerns institutions of natural history and the imperilment of humanity's biospheric inheritance. Both of these museum manifestos might be framed as cosmopolitan proposals. This is so I contend in as much as they share a museum pedagogics—via, respectively, strategies of tolerance and sustainability—that would adjust citizen-subjects to shared cultural or ecological worlds that are posited beyond the borders of the nation-state and outside particular or parochial interests. Subsequently, I turn to what might be called the empirics of cosmopolitanism. This concerns the qualitative investigation of banal or everyday cosmopolitanism, which is largely ignored by museum manifestos of cosmopolitanism and the social theory of global risk; but which, nevertheless, is assumed by such formulations if the political effect of their claims is to hold. It is in contrasting these various mobilizations of the cosmopolitan—the theoretical, the museological and the empirical—that I develop the proposition of this chapter: namely, that cosmopolitan claims are based on the assumption that a common world exists prior to its assemblage as such, and, in as much as these claims inform museums' pedagogic engagements with the issues of climate change, they risk foreclosing on the publics that they might otherwise come to assemble.

TWO MUSEUM MANIFESTOS

For many of its contemporary interlocutors, the modern public museum has its beginnings in the early expansive thrust of modernity and stands as

the bastion of Enlightenment reason. For example, prominent museologist, Geoffrey Lewis, writes the "idea of universality can be found at the heart of the first public museums" (Lewis 2004a, 40; also see 2004b).[6] He continues: "A product of world exploration and developing global trade among the maritime nations of Western Europe, these museums reflected the spirit of inquiry and enterprise of their age" (2004a, 40). Similarly, the noted museum scholar and administrator, James Cuno, locates the formation of the modern museum in "the polymathic ideal of the Enlightenment" (2008, 123). While such accounts are inclined to gloss the complexities of the histories of the emergence of modern museums—which are of course cross cut with those of different national formations, different experiences of imperial expansion, contending knowledge practices, and contrasting patterns of social stratification that must necessarily qualify such accounts (see Bennett 1995; Hooper-Greenhill 1992; Mackenzie 2009; Prior 2002)—these statements are not primarily for the purpose of rigorous historical analysis. Rather they are expressive of the politics of the present: in this case, the spirited defense of "the universal museum."

For example, it is Cuno's contention that this institution is imbued with a legacy that well serves the present, for it introduces "us to the larger world of which we are a part," which he claims, is a notion "based on the eighteenth-century ideal of cosmopolitanism: 'citizen of the cosmos', of the world, the universe" (2008, 124). In a context of rapid globalization and of reactionary religious fundamentalisms and ethnic nationalisms, he contends that it is precisely this cosmopolitan legacy of the museum that needs to be defended in the present. Cuno announces that museums ought to foster an openness to the world, and with it, the cultivation of both the sense of humankind as heir to a single shared world heritage and a tolerance and respect for its diversity. In this he finds the cosmopolitan idea of the museum virtuous: "it is good for us, for our species, to experience the full diversity of human cultural industry in order to better understand our place in the world, as of but one culture and one time among many" (Cuno 2008, 123). It was along precisely these lines that Cuno has recently defended "the fate of encyclopaedic museums" in discussions at the World Economic Forum (Davos 2013, cited in Cuno 2013, n.p.).

Notwithstanding the problematic slippage between the universal and the cosmopolitan, it is the International Council of Museums' (ICOM) *Declaration on the Importance and Value of Universal Museums* (2006) that is regularly figured as the formal expression of this museological cosmopolitanism. Signed in 2002 by the directors of eighteen major institutions from Europe and North America, it asserted: "Museums are agents in the development of culture . . . we should acknowledge that museums serve not just the citizens of one nation but the people of every nation" (2006, 248). The rationale of this position has won the approval of the prominent philosopher of cosmopolitanism, Kwame Anthony Appiah, who has written: "However self-serving it may seem, the British Museum's claim

to be a repository of the heritage not of Britain but of the world strikes me as exactly right" (2006, 2).[7] Yet as the tension in Appiah's statement indicates this is a controversial position. As others have contended, such cosmopolitan arguments, deployed to demolish the claims of cultural property appropriation made against majority museums, close dialogue between the museum and source communities with investments in the artefacts it holds, as it rules out the possibility of repatriation. Rather than an opening to the other and its potentially disruptive presence, cosmopolitanism in this context becomes a ruse for shoring up prior claims of imperial patrimony in the form of the metropolitan custodianship of world heritage. A position the art historian, Andrew McClellan, (2009) designates with the neologism, "Cosmocharlatanism."

This position might be juxtaposed with *The Buffon Declaration: Natural History Institutions and the Environmental Crisis* (2007). In 2007 representatives of ninety-three natural history institutions—natural history museums, research institutes, botanic gardens, and zoos—from thirty-six countries convened in Paris. As the appellation makes clear in its homage to the eighteenth century French naturalist, the signatory institutions position themselves in the Enlightenment heritage to which claims for the universal museum made their appeal. However, the declaration is concerned not with the preservation of cultural diversity in the interests of the common heritage of humankind, but with the protection of the planet's biodiversity on which "our common future" depends (*The Buffon Declaration* 2007, n.p.). Concomitantly, the cosmopolitan ethos of this declaration targets behavior, in this case, not for a tolerance of cultural diversity, but for the sustainability of biodiversity. Here the signatories agreed that their institutions "are a forum for direct engagement with civil society, which is indispensable for helping bring about the changes of behaviour on which our common future and the future of nature depend" (*The Buffon Declaration* 2007, n.p.). Similarly to the ICOM's declaration on the universal museum, this document seeks to work against particular property claims in the interests of commonality; however, in this case, not against the perceived parochial claims of cultural patrimony, but rather against the enclosure of biodiversity in the form of bioprospecting. *The Buffon Declaration* calls on "governments and the Convention on Biological Diversity: to recognize the difference between profit-oriented bioprospecting and science-oriented research for the public good, and—to facilitate non-commercial biodiversity collecting and the movement of specimens" (2007, n.p.). Here, it would seem, the diversity of the biosphere is posited as humanity's inheritance to be defended from its alienation as private property, nevertheless it remains a resource over which the human is sovereign.

Despite these similarities, the cosmopolitan position motivating these documents appear to have rather different politics. That is, if we are to believe Canadian museologist, Robert Janes, who—in registering his preference for the position taken by *The Buffon Declaration* over the ICOM's

declaration on universal museums—finds that the former demonstrates "an explicit interest . . . in trying to make a difference," while, the latter is "an ethnocentric [manifesto] and colonial relic" (Janes 2009, 85).[8] Nevertheless, in as much as these two museological expressions of the cosmopolitan share particular assumptions about the common world to which "we"—citizens of the cosmos or the world—are to be attuned with tolerance and sustainability, there is a sense in which *The Buffon Declaration* perhaps too shares in a cosmocharlatanism. This is so not quite in the sense that McClellan (2009) intends it, but rather, that these particular proposals entertain a more widely shared feature of cosmopolitan claims: namely, the misconception that a cosmos, a world, a universe, pre-exists its articulation as such. In this they assume a "mono-naturalism" (Latour 2010; Viveiros de Castro 2005)—more on this later—where the museum's pedagogic task is to adjust the cosmopolitan citizen to this already present condition. It is via a theoretical detour that I come to contest the contention on which these two museum manifestos rest: that it is the work of reason to accommodate the citizen-subject to an already existing common world.

GLOBAL RISK AND COSMOPOLITANIZATION

Intrinsic to these museological expressions of the cosmopolitan is a concern with the threats and risks to the common world in whose service the museum would put itself. That is, the universal museum, as bastion of liberal humanism, advances unity in diversity as a precautionary principle against the terrorism and sectarian violence that threatens the prospect of universal peace; while *The Buffon Declaration*, in promoting and protecting biodiversity, toils against the threat to the biosphere that global modernity's environmental crisis presents to life and its "common future" (*The Buffon Declaration* 2007, n.p.). The work of the social theorist Ulrich Beck is useful here in holding these concerns in a single analytical vista, in particular, his reworking—through the optic of cosmopolitanism—of his well-known thesis on "risk society" (1992b; 1999; 2008). Beck's formulations on global risk make regular reference to terrorism and the ecological crisis among a plethora of other contingencies of global modernity, including nuclear accidents, environmental pollution, bio-tech hazards, climate change and financial crises (Beck 1992b; 1999; 2008). As the unintended consequences of modernization, what these "manufactured uncertainties" as he terms them share is a threat of catastrophe whose global scale renders their risks not only beyond the control of any one nation-state, but incalculable and irreparable in their consequences. Pertinent to my argument is Beck's thesis on the political reflexivity of global risk.

Beck is concerned with the prospects for transnational solidarities that emerge in the face of such risks. Risk, he contends, in late or reflexive modernity forms the basis of socialization through its capacity to construct

"risk communities" that transcend national boundaries. It is through such processes that the cosmopolitan possibilities of global risk lie. Because global risk escapes the human sensorium, this reflexivity is conditioned by the process of bringing risk to vision through publicized science. The "intangibility of threats to civilization," Beck writes, "only come to consciousness in scientized thought and cannot be directly related to primary experience" (1992b, 52). "Making the threats publicly visible and arousing attention in detail in one's own living space," he continues, provides the "cultural eyes through which the 'blind *citoyen*' can perhaps win back the autonomy of their own judgment" (1992a, 119–120).

In many ways cosmopolitan museum proposals might be read as this pursuit for the "making visible;" of this quest for the restoration of citizenry vision through secular reason. This would seem clear enough in statements like *The Buffon Declaration* in which a museum pedagogics is to be embarked upon so to warn of the consequences of the environmental crisis and biodiversity lost. It is also true of the universal museum in as much as the project of world heritage and its unitary subject, humankind, are positioned to work against the various fundamentalisms that threaten to fragment that subject with explosive violence. It is by bringing these risks to vision that the museum comes to advocate the prophylactics of tolerance and sustainability through which a common world is to be both recognized and protected. Nevertheless, it is important to note here that Beck is writing against the idealist tradition—to which I would suggest these two museum declarations are heirs—and so too of the top-down expressions of cosmopolitanism they come to deploy. Beck turns to Marx and Engels' ([1848] 1952) *Communist Manifesto*.

Writing on the 1851 Great Exhibition, Marx and Engels observed: "This exhibition is a striking proof of the concentrated power with which modern large-scale industry is everywhere demolishing national barriers and increasingly blurring local peculiarities of production, society and national character among all peoples" (1850, n.p.). This statement resonates with those made in the *Communist Manifesto,* where Marx and Engels contend: "the bourgeoisie has through its exploitation of the world market given a cosmopolitan character to production and consumption in every country . . . National one-sidedness and narrow-mindedness become more and more impossible" ([1848] 1952, 46–47). According to the *Mansion House* resolution, the Great Exhibition "was expected to inaugurate universal peace" (Spencer 1971, 210), it was for Marx and Engels an event that exemplified the cosmopolitanizing effect of the emergence of a world market that would overcome national parochialism. It is on this notion of cosmopolitanism as a material consequence of the process of globalization that Beck draws. Formally this is developed in the concept of "enforced cosmopolitanization" (Beck 2007, 287). It is to this dynamic of global risk that I think the current expressions of a museological cosmopolitanism can be recruited.

Beck juxtaposes this cosmopolitanization concept with normative ideas of cosmopolitanism. Countering notions that pose cosmopolitanism as a

political project—as, for instance, a task to order the world as in Kant's "constitution establishing world citizenship" (cited in Linklater 2007, 117), or, as the critical horizon from which to hold the present to account, in the form of cosmopolitan democracy as a "necessary utopia"[9]—Beck turns to Marx. This is in the sense that he too reads cosmopolitanization as a "side effect" of globalization, enforced on subjects by the actualities that the social processes of a globalizing world imposes on them. However, in his "Cosmopolitan Manifesto" Beck draws a distinction between his manifesto and the 1848 text in that the former is "about transnational-national conflict" and the social inequalities of risk; the latter, about class contradiction (Beck 1999, 14). For Beck, while, enforced cosmopolitanization gives the lie to the territorial integrity of the nation state, rupturing national borders with a cultural *mélange,* its social dynamic concerns, subject positions in relation to risk, not class as Marx and Engels would have it. Beck writes:

> Global risks tear down national boundaries and jumble together the native with the foreign. The distant other is becoming the inclusive other. Everyday life is becoming cosmopolitan. Human beings must find a meaning of life in the exchange with others and no longer in the encounter with the like . . . global risks activate and connect actors across borders, who otherwise don't want to have anything to do with one another . . . [It] opens our eyes to the uncontrollable liabilities that something might happen to us, might befall us. (2007, 287)

On Beck's account, then, cosmopolitanization is a side effect of a world of global risk that solicits the recognition of, as he writes, "a common world, a world that, for better or worse, we all share, a world that has no outside, no other" (Beck 2010b, 178).

Current expressions of museological cosmopolitanism might usefully be located in this dynamic. A dynamic that finds its momentum less in the eighteenth century philosophical tradition on which its interlocutors rhetorically, than in the actual processes of globalization that increasingly imperil the common world into whose service the cosmopolitan museum's interlocutors would press it. It is these threats to human civilization that the museum's expertise would draw to public attention; be it a universal cultural heritage or a global biospheric inheritance jeopardized by the unintended consequences of a globalizing world. It is to this world that these projects would insist there is no outside, no other.

BANAL COSMOPOLITANISM AND THE EMPIRICS OF THE MUSEUM VISITOR

The possibility of a constituency for this world—of a world for global citizenship—would seem to be contingent on forms of everyday cosmopolitanism by

which subjects are open to a common world and its obligations. However, neither cosmopolitan museum manifestos nor social theories of global risk offer much purchase on the empirics of this banal cosmopolitanism. They supply no particular insight into, what others have termed, "the cosmopolitan disposition," which might shape ordinary, everyday subjectivities on which their formulations depend—it would seem necessarily—for their political effect (see Urry and Szerszynski 2002). A number of studies in the fields of sociology and museum studies have investigated the possibility of such a disposition in qualitative studies of metropolitan subjects in advanced capitalist societies. Drawing on these analyses I want to suggest that there is a problem that such empirical accounts of cosmopolitanism share with the theoretical or programmatic formulations that they would supplement. This is so in the sense that they too presume a common world. This time less as a philosophical imposition and more as an ethnographic quasi-question: that is, methodologically, they proceed by asking their respondents: "do you recognize this world?"—all the while, it would seem, in the full confidence of its presence. Among other things, this presumption neglects the human/nonhuman relations through which this shared world might come to be constituted. In developing this contention I turn to the notion of cosmopolitics, which underscores the anthropocentrism on which such cosmopolitan formulations come to rest.

In the sociological literature theoretical proclamations of the existence of an everyday or banal cosmopolitanism—as figured, for example, in Beck's notion of enforced cosmopolitanization—have been met with the contention that these claims require empirical substantiation. A number of studies have sought to measure the cosmopolitan dispositions of the everyday. For example, John Urry and his colleagues have used focus groups to probe for cosmopolitan sentiment in northwest England. Exploring themes of mobility and cosmopolitanism this research was pursued with the intention of investigating whether or not "claims about contemporary cosmopolitanism are empirically significant" (Urry and Szerszynski 2002, 471; also see Szerszynski and Toogood 2000; Urry 2003). More recently Zlatko Skrbis and collaborators have conducted similar research in Brisbane, Australia, which has drawn out the ambivalence of "ordinary cosmopolitanism" (Skrbis, Kendall, and Woodward 2004; Skrbis and Woodward 2007). These studies are instructive in their efforts to probe a cosmopolitan ordinariness and in their demonstration of the limits of its reach and the ambivalence of its deployment. Reporting on the findings of his study, Urry observed:

> We found little evidence of what we had systematically hypothesised as the thesis of 'global citizenship' . . . There was a strong awareness of the . . . extended relations connecting them to other peoples, places and environments. . . . [Nevertheless] Respondents generally found it difficult to extend the taken-for-granted sense of moral connectedness that pertains in their more grounded communities to the larger and more

> abstract global community, since the latter seemed to lack the immediacy and groundedness ascribable to the former. (2003, 9)

Summarizing their findings, Skrbis and Woodward contended that:

> [Ambivalence] is a structural feature of the discourse of ordinary cosmopolitanism whereby individuals are making reflexive and deliberative judgments in relation to local and global domains. . . . Thus people become not simply more or less open and cosmopolitan, but they reservedly deployed their cosmopolitanism, thus allowing us to reconcile the frequently occurring gaps between people's philosophical commitment to cosmopolitan openness and often parochial practices. (2007, 745–746)

While it would no doubt be rash to generalize from these studies, it is not only the claims of social theory that these findings complicate, they would also qualify those of the museum manifestos with which I am concerned. This is so in as much as they would suggest that the cosmopolitan museum has an ambivalent audience for its claims of sustainability and tolerance with which interlocutors must negotiate. This perhaps is to make the obvious point that museological appeals for behaviour change in the interests of a common world are likely to be met with ambivalence. More importantly it is also to acknowledge a dissensus which suggests that, far from existing, a common world is yet to be composed.

Aspects of the empirical research for "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions" could be read as supporting this contention.[10] This project conducted focus group research in Sydney, Melbourne and New Jersey in 2009. Part of that study was concerned specifically with the cosmopolitan dispositions of museum visitors as they are solicited in relation to the global risk posited by climate change. The aim as stated in the brief for the research was "to understand respondents' sense of global connectivity of climate change" and their views on the responsibility to others "given the uneven distribution of risk that it imposes." Stimuli for discussion included the Greenpeace video, *A Future for Kiribati,* which focused on the inundation of those islands, and a paraphrasing of Nicholas Stern's contention that "it is unjust that the poorest countries suffer the most even though they have contributed least to the causes of climate change" (Stern 2006, vi–vii). I give a brief report on the pertinent findings below.[11]

The perspectives of respondents on their relations to those from whom they are spatially remote, which emerged in their discussions of the stimuli, were marked by ambivalence. For example responses to the video oscillated between statements endorsing "a humanitarian responsibility" that categorically claimed a responsibility for distant others and those that suggested a diminished responsibility. The latter were advanced on various grounds

including uncertainty that climate change was a genuine phenomenon; or, in the Australian groups, that other developed countries should have a greater degree of responsibility since Australia is only a small nation on the world stage. Other respondents simply withdrew care, contending: "we've got to look after ourselves at the moment." Such sentiments were particularly marked in the American context as respondents struggled with the impact of the unfolding global financial crisis on their own lives. For those who did express empathy for the inhabitants of Kiribati the question of responsibility was met with perplexity and regret. Here there was a general reflexivity about this sentiment in the focus groups. Respondents who felt compassion recognized it as a vacuous empathy, since they were not moved to action. One respondent contended that we are "all guilty," we all "lack empathy" at some point—highlighting, perhaps, the anthropological limit to care.

Critical to these limits for respondents were the issues of mediation and distance. For some the video solicited a number of strategies to close the social distance between themselves and the subjects of the video. These included: inverting the relationship, "imagine if it was Bondi;" establishing a foreshortened temporality between here and there, "a remote island one day, the city the next;" identifying with a shared subject position, "a mother will sense [another] mother's suffering in another country;" and, by the universalizing of the particular, "earth is that little island, there is nowhere else for us to go." Other respondents viewed the Islanders' predicament as predictive; identifying their fate as "our" horizon. As one discussant put it, that video shows "where we are headed towards." On the other hand, respondents commented that a media saturated with catastrophe generates not empathy but apathy. It produces a hierarchy of calamity by which one distances oneself from the suffering of others, "it's terrible . . . but it's not as bad as . . ." This led respondents to remark on the condition of "compassion fatigue;" you become "complacent." For some, the video generated neither empathy nor indifference to others, but rather concern for the self; that is, for their own security and prosperity. In the negative, this was expressed as a latent fear of slipping into personal hardship and poverty. In the positive, it provided an affirmative assessment of one's present security, comfort and wealth: "we're pretty lucky here." In this it seems that the mediation of distant suffering reminds respondents of their own vulnerability; while, simultaneously, providing them with "the evasive reassurance that 'worse things happen elsewhere'" (Cohen 2001, 20, cited in Chouliaraki 2008, 398).

While participants undoubtedly recognized and experienced themselves in terms of a globalized world, at least on some occasions, their commitments to the normative horizon of cosmopolitan belonging were marked by ambivalence. There is a discernible gap—on which respondents were often reflective—between their professed commitment to a cosmopolitan ethos and their particular modes of behaviour. Frequently, this is expressed as a perplexity in the face of the abstract nature of the climate crisis; or, with slightly less frequency, in a parochial defensiveness in the presence of

seemingly overwhelming global forces. Either way, the concepts of global connectedness and responsibility that respondents did deploy seemed to be very firmly grounded in notions of proximate citizenship and belonging: of individual responsibility, of family, of locality. Indeed, to construct empathy for others that fall outside these categories, they engaged in strategies that brought them into this fold of the familiar. The results, then, reveal ambivalent cosmopolitans—ones who acknowledge that climate change creates profound obligations to distant others, yet identify with the need to defend current local interests; who recognize that something must be done, yet know not what to do; who oscillate between empathy and apathy, between complacency and fear.

In this data then, while there is a sense of global interconnectedness, this did not translate into modes of solidarity and responsibility signaled by the idea of cosmopolitan citizenship; of a belonging to a common world. Rather, subjects expressed a mixed relationship to this interconnectedness. It might be deduced that enforced cosmopolitanization offers no necessary impetus toward a cosmopolitan momentum; it is as likely to lead to parochial retreat as it is to cosmopolitan openness. Living with the materiality of globalization and its concomitant risks does not necessarily run to the recognition of and identification with a common world. It is here that I turn to the notion of the cosmopolitical, for it radically expands this dissensus on which the cosmopolitan settlement too rapidly forecloses.

MULTINATURALISM AND THE COSMOPOLITICAL

Bruno Latour has advanced this formulation in contexts pertinent to my argument: including in exchange with Beck (Latour 2004; also see Latour 2003); and, in a curatorial capacity for the exhibition, "Making Things Public: Atmospheres of Democracy," Centre for Art and Media Technologies, Karlsruhe (Latour and Weibel 2005). Interrogating Beck's formulations on cosmopolitanism, Latour argues that it is a thesis resting on an unacknowledged premise: that scientific reason will reveal the presence of an already existing world to which the cosmopolitan citizen is to be reconciled. For Latour this is a flawed position. Developing the work of Eduardo Viveiros de Castro (2005), anthropologist at Brazil's National Museum, which interrogates claims of Western multiculturalism from positions of an Indigenous multinaturalism, Latour writes:

> Beck does not realize . . . that whenever cosmopolitanism has been tried out, from Alexandria to the United Nations, it has been during the great periods of complete confidence in the ability of reason and, later, science to know the one cosmos whose existence and solid certainty could then prop up all efforts to build the world metropolis of which we are all too happy to be citizens. The problem we face now is that it's precisely this 'one cosmos,' what I call mononaturalism, that has disappeared. (2004, 453)

On Latour's account mononaturalism is the unnoticed premise to all cosmopolitan claims. It is this *nature as known to reason* that supplies the common ground by which all human action can be measured, and it is on this nature that cosmopolitan claims necessarily rely to justify their universality. It is thus the basis for the cosmopolitan settlement, where all humans come together as a political community in the "we" that is the citizenry of the world. However, it would seem that the blind are leading the blind, for the "blind *citoyen*" is guided by a similarly disabled proposition (Beck 1992a, 120). As Latour contends cosmopolitan accounts suffer from "anthropological blindness: nature, the world, the cosmos, is simply there; and since humans share basic characteristics, our view of the world is, at baseline, the same everywhere" (2004, 453). However, as the contestations over anthropogenic climate change make clear there are contesting cosmograms with regard to the nature of nature and the agency of the human.[12] For Latour, then, cosmopolitanism is mistaken because it assumes precisely what is lacking: the one cosmos.

It is against this position and in a situation of contesting cosmograms that Latour advances the notion of cosmopolitics. This works to refuse the closure of politics to the exclusively human and to avoid the assumption of a pre-existing cosmos awaiting recognition. Drawing on Isabelle Stengers' formulations, Latour writes:

> The presence of cosmos in cosmopolitics resists the tendency of politics to mean the give-and-take in an exclusive human club. The presence of politics in cosmopolitics resists the tendency of cosmos to mean a finite list of entities that must be taken into account. Cosmos protects against the premature closure of politics, and politics against the premature closure of cosmos. (2004, 454)

For Latour politics concerns the ways in which the human and the nonhuman are assembled and the associations they form; while, the cosmos, "if it is to mean anything, must embrace, literally, everything—including all the vast numbers of nonhuman entities making humans act" (2004, 454). On this account as one of his interlocutors puts it, "all reality is political, but not all politics is human" (Harman 2009, 98).

A common world for Latour cannot be "something we come to recognize, as though it had always been here (and we had not until now noticed it)" (2004, 455). It cannot pre-exist its articulation. Rather, a common world must be assembled through chains of human and nonhuman actors. Cosmopolitics is this work of assembling a shared world. A common world, he writes, "if there is going to be one, is something we will have to build, tooth and nail, together:"

> Cosmopolitans may dream of the time when citizens of the world come to recognize that they all inhabit the same world . . . cosmopolitics

> are up against a somewhat more daunting task: to see how this 'same world' can be slowly composed. (2004, 457)

In his, "Compositionist Manifesto," Latour (2010) outlines this alternative to theories of modernity, reflexive or otherwise. Here Latour identifies a "tenuous relation" with the *Communist Manifesto*. While rejecting the latter for its modernist commitments, he contends "the two manifestos [do] have something in common: namely the search for the Common" (2010, 14). However, in parting company with Marx, and indeed Beck, he adds the proviso that this is with the "small but crucial difference that it has to be slowly composed instead of being taken for granted and imposed on all" (2010, 15). For Latour this composition of the common is paramount as a question of ecology: "How can a livable and breathable 'home' be built for . . . [the] masses?" This, he writes, "is the only question worth raising in this *Compositionist Manifesto* . . . how will we find a sustainable home on Gaia?" (2010, 15).

In her contribution to the exhibition catalogue, *Making Things Public: Atmospheres of Democracy,* Stengers (2005) invokes Deleuze's idiot. The idiot is the one who knows how to slow things down to prevent the rush to consensus. The one

> who resists the consensual way in which the situation is presented and in which emergencies mobilize thought or action. This is not because the presentation would be false or because emergencies are believed to be lies, but because 'there is something more important.' (Stengers 2005, 994)

The idiot, Stengers continues, "demands that we slow down, that we don't consider ourselves authorized to believe we possess the meaning of what we know" (2005, 995). It is from this cosmopolitical perspective that she puts forward a twofold question:

> How to design the political scene in a way that actively protects it from the fiction that 'humans of good will decide in the name of the general interest'? . . . [And] how to design it in such a way that collective thinking has to proceed 'in the presence of' those who would otherwise be likely to be disqualified as having idiotically nothing to propose, hindering the emergent 'common account'? (2005, 1002)

The unfolding crisis of anthropogenic climate change demands that decisions that once seemed to have nothing to with Kiribati, polar bears, glaciers, the gulf-stream, the carbon cycle, must now be made in their presence, along with innumerable other human and nonhuman actors, if we are to work toward the composition of a common world—of a livable, breathable "home" on planet Earth. Perhaps, the cosmopolitical museum might come to put forward proposals by which "we" think of our decisions "in the presence of" those others once disqualified by the borders of nation,

species, and animation, not on the assumption that we nevertheless share a common world, but that we enter into the hard work of its composition.[13] To recall Hebda's contention with which I opened: with regard to the climate crisis we find ourselves in networks of relations vastly more complex than the metaphor of "the crossroad" would allow, here the "vital role" of museums might lie in cosmopolitical experiments that—in facing the idiot's demand that "we don't consider ourselves authorized to believe we possess the meaning of what we know"—come to slow down decisions "about which turn to take" and open up the chance of a common world.

NOTES

1. For commentaries on aspects of these developments see the essays in Cameron (2011).
2. An earlier version of these arguments was published in *Museum and Society* (See Dibley 2011).
3. Nevertheless, for some recent overviews see Fine (2007), Held (2010), and Delanty (2012).
4. For a recent critique of Beck's position on climate change see Hamilton (2012).
5. A case in point is the collection edited by Cheah and Robbins (1998) which, while entitled *Cosmopolitics,* shares little common ground with concerns that Stengers (2005) and Latour (2010) seek to address under that rubric.
6. These statements were produced in Lewis' capacity as chair of International Council of Museums (ICOM), Ethics Committee.
7. It needs to be noted that while the British Museum in many ways exemplifies the universal museum, this institution was not itself a signatory to ICOM's Declaration.
8. While the former has solicited heated debate, Janes notes that the latter remains, "groundbreaking . . . largely unheralded" (2009, 85).
9. For examples, see the work of Habermas, Held, and Honneth.
10. For articles reporting the findings of this study see Cameron (2012) and Cameron, Hodge, and Salazar (2013).
11. Material for the following paragraphs draws on the *HSGC Report Five* (2010).
12. A cosmogram, as John Tresch has usefully defined it, is "a text that results in a concrete practice and set of objects, which weave together a complete inventory or map of the world" (2005, 67).
13. Whether the cosmopolitical museum, whose claim would be to include the nonhumans among its public, is a continuation of the "redemptive narrative" central to the political logic of the modern museum form is, I think, an open question (Dibley 2005).

REFERENCES

Appiah, Kwame Anthony. 2006. "Whose Culture Is It?" *New York Review of Books* 53(2): 38–41.

Beck, Ulrich. 1992a. "From Industrial Society to the Risk Society: Questions of Survival, Social Structure and Ecological Enlightenment." *Theory, Culture & Society* 9(1): 97–123. doi:10.1177/026327692009001006

Beck, Ulrich. 1992b. *Risk Society: Towards a New Modernity.* London: Sage.
Beck, Ulrich. 1998. "The Cosmopolitan Manifesto." *New Statesman* March 20: 28–30.
Beck, Ulrich. 1999. *World Risk Society.* Cambridge, MA: Polity.
Beck, Ulrich. 2007. "The Cosmopolitan Condition: Why Methodological Nationalism Fails." *Theory, Culture & Society* 24: 7–8, 290–296. doi:10.1177/02632764070240072505
Beck, Ulrich. 2008. *World at Risk*. Cambridge, MA: Polity.
Beck, Ulrich. 2010a. "Climate for Change, or How to Create a Green Modernity?" *Theory, Culture & Society* 27: 2–3, 254–266. doi: 10.1177/0263276409358729
Beck, Ulrich. 2010b. "Remapping Social Inequalities in an Age of Climate Change: For a Cosmopolitan Renewal of Sociology." *Global Networks* 10(2): 165–181. doi: 10.1111/j.1471–0374.2010.00281.x
Bennett, Tony. 1995. *The Birth of the Museum*. London: Routledge.
The Buffon Declaration: Natural History Institutions and the Environmental Crisis. 2007. www.bfn.de/fileadmin/ABS/. . ./BuffonDeclarationFinal%5B1%5D.pdf
Cameron, Fiona R., ed. 2011. "Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions." *Museum and Society* 9(2).
Cameron, Fiona R. 2012. "Climate Change, Agencies and the Museum and Science Centre Sector." *Museum Management and Curatorship* 27(4): 317–339. doi.org/10.1080/09647775.2012.720183
Cameron, Fiona R., Bob Hodge and Juan F Salazar. 2013. "Representing Climate Change in Museum Space and Places." *WIREs Climate Change* 4: 9–21. doi: 10.1002/wcc.200
Cheah, Pheng and Bruce Robbins, eds. 1998. *Cosmopolitics: Thinking and Feeling beyond the Nation*. Minneapolis: University of Minnesota Press.
Chouliaraki, Lilie. 2008. "The Mediation of Suffering and the Vision of a Cosmopolitan Public." *Television & New Media* 9(5): 371–391. doi: 10.1177/1527476408315496
Cohen, Stanley. 2001. *States of Denial: Knowing about Atrocities and Suffering*. Cambridge: Polity.
Cuno, James. 2008. *Who Owns Antiquity? Museums and the Battle over our Ancient Heritage*. Princeton, NJ: Princeton University Press.
Cuno, James. 2013. "The Arts on the World Economic Stage: Notes from Davos." *Irsis: The Online Magazine of the Getty,* January 30. http://blogs.getty.edu/iris/the-arts-on-the-world-economic-stage-notes-from-davos/
Delanty, Gerard, ed. 2012. *Routledge Handbook of Cosmopolitanism Studies*. Abingdon: Routledge.
Dibley, Ben. 2005. "The Museum's Redemption: Contact Zones, Government, and the Limits of Reform." *International Journal of Cultural Studies* 8(1): 5–27. doi: 10.1177/1367877905050160
Dibley, Ben. 2011. "Museums and a Common World: Climate Change, Cosmopolitics, Museum Practice." *Museum and Society* 9(2): 154–165.
Fine, Robert. 2007. *Cosmopolitanism*. London: Routledge.
Hamilton, Clive. 2012. "Theories of Climate Change." *Australian Journal of Political Science* 47(4): 721–729. doi:10.1080/10361146.2012.732213
Harman, Graham. 2009. *Prince of Networks: Bruno Latour and Metaphysics*. Melbourne: Re.press.
Hebda, Richard. 2007. "Museums, Climate Change and Sustainability." *Museum Management and Curatorship* 22(4): 329–336. doi:10.1080/09647770701757682
Held, David. 2010. *Cosmopolitanism: Ideals and Realities*. Cambridge, MA: Polity.
Hooper-Greenhill, Eilean. 1992. *Museums and the Shaping of Knowledge*. London: Routledge.

HSGC Report Five: Climate Change and Global Citizenship. 2010. Unpublished manuscript. Centre for Cultural Research, Sydney, University of Western Sydney.

Hulme, Mike. 2010. "Cosmopolitan Climates: Hybridity, Foresight and Meaning." *Theory, Culture & Society* 27(2–3): 267–276. doi: 10.1177/0263276409358730

ICOM. [2002] 2006. "Declaration on the Importance and Value of Universal Museums: 'Museums Serve Every Nation.'" In *Museum Frictions: public cultures/global transformations,* edited by Ivan Karp, 247–249. Durham, NC: Duke University Press.

Janes, Robert. 2009. *Museums in a Troubled World: Renewal, Irrelevance or Collapse?* London: Routledge.

Latour, Bruno. 2003. "Is Re-modernization Occurring—And If So, How to Prove It? A Commentary on Ulrich Beck." *Theory, Culture & Society* 20(2): 35–48. doi: 10.1177/0263276403020002002

Latour, Bruno. 2004. "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Terms of Ulrich Beck." *Common Knowledge* 10(3): 450–462.

Latour, Bruno. 2010. *An Attempt at Writing a "Compositionist Manifesto*." www.bruno-latour.fr/sites/default/files/120-NLH-GB.pdf

Latour, Bruno and Peter Weibel, eds. 2005. *Making Things Public: Atmospheres of Democracy.* Cambridge, MA: MIT Press.

Lewis, Geoffrey. 2004a. "A Debated Museum Concept: Partnership in universality." *Museum International* 56(4): 44–45. doi:10.1111/j.1468–0033.2004.00048.x

Lewis, Geoffrey. 2004b. "The Universal Museum: a Special Case?" *ICOM News* (1), 3.

Linklater, Andrew. 2007. *Critical Theory and World Politics: Citizenship, Sovereignty and Humanity.* London: Routledge.

Marx, Karl and Friedrich Engels. [1848] 1952. *The Manifesto of the Communist Party.*Moscow: Foreign Languages.

Marx, Karl and Friedrich Engels. 1850. *Neue Rheinische Zeitung Revue,* May-October. www.marxists.org/archive/marx/works/1850/11/01.htm

McClellan, Andrew. 2009. "Cosmocharlatanism." *Oxford Art Journal* 32(1): 167–171.

Mackenzie, John M. 2009. *Museums and Empire: Natural History, Human Cultures and Colonial Identities*. Manchester: Manchester University Press.

Prior, Nick. 2002 *Museums and Modernity: Art Galleries and the Making of Modern Culture*. Oxford: Berg.

Skrbis, Zlatko, Gavin Kendall, and Ian Woodward. 2004. "Locating Cosmopolitanism: Between Humanist Ideal and Grounded Social Category." *Theory, Culture & Society* 21(6): 115–136. doi: 10.1177/0263276404047418

Skrbis, Zlatko and Ian Woodward. 2007. "The Ambivalence of Ordinary Cosmopolitanism: Investigating the Limits of Cosmopolitan Openness." *The Sociological Review* 55(4): 730–747. doi: 10.1111/j.1467–954X.2007.00750.x

Spencer, Herbert. [1902] 1971. "Re–Barbarization." In *Herbert Spencer: Structure, Function and Evolution,* edited by S. Andreski, 207–213. London: Thomas Nelson.

Stern, Nicholas. 2006. *The Stern Review: The Economics of Climate Change*. http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/stern_review_report.htm

Stengers, Isabelle. 2005. "The Cosmopolitical Proposal." In *Making Things: Public Atmospheres of Democracy,* edited by Bruno Latour and Peter Weibel, 994–1,003. Cambridge, MA: MIT Press.

Szerszynski, Bronislaw and Mark Toogood. 2000. "Global Citizenship, the Environment and the Mass Media." In *The Media Politics of Environmental Risks,* edited by Barbara Adam, Stuart Allan and Cynthia Carter, 218–228. London and New York: Routledge.

Tresch, John. 2005. "Cosmogram" [interview with Jean-Christophe Royoux]. In *Cosmograms*, edited by Melik Ohanian and Jean-Christophe Royoux, 67–76. New York: Lukas & Sternberg.

Urry, John. 2003. *The Global Media and Cosmopolitanism*. Department of Sociology, Lancaster University, Lancaster. www.comp.lancs.ac.uk/sociology/papers/Urry-Global-Media.pdf

Urry, John and Bronislaw Szerszynski. 2002. "Cultures of Cosmopolitanism." *The Sociological Review* 50(4): 462–481. doi: 10.1111/1467–954X.00394

Viveiros de Castro, Eduardo. 2005. "From Multi-Culturalism to Multi-Naturalism." In *Cosmograms*, edited by Melik Ohanian and Jean-Christophe Royoux, 137–156. New York: Lukas & Sternberg.

4 We Are on Nature's Side? Experimental Work in Rewriting Narratives of Climate Change for Museum Exhibitions

Fiona R. Cameron

INTRODUCTION

"We are on Nature's side," "Nature with a big N" and "Nature's Treasure-house" are respectively a quote and an image on a paper bag from the gift shop at London's Natural History Museum, and the title of a book on the history of the institution. While this branding gestures toward benevolent and honorable intentions toward Nature on the part of the museum, it is an occasion to pause and reflect on what these messages communicate about this museum, museums in general and their relation with the nonhuman world. I contend that these words and images suggest that humans are there to protect Nature; are custodians of nature in a way that displays hubris and claims to patriarchal continuity; that museums as modernist institutions give themselves the authority to speak for the nonhuman; and that museums act as storehouses for all the kingdoms of Nature. The image of the big N on the bag gestures toward the proposition that nature exists as Big Nature, a metaphor used to categorise and describe all nonhuman others and earthly processes. The nonhuman, animals, insects, rocks and earthly processes are therefore relegated to the position of a passive object to be documented, described, named, protected, controlled and used for human ends. These museum examples clearly exemplify modernity's relations with nature.

It is now a widely held view that the current ecological crisis originates from modern industrial and fossil fuel burning practices and styles of thought based on big Nature, Culture/nature dualistic principles, hubristic doctrines and the exploitation of the environment (Head and Gibson 2012). Human geographers J.K. Gibson-Graham (2008, 324) suggest that while performing the dualism of Culture/nature and its hubristic position has led us into the current planetary crisis "un-performing these modes of thinking is the key strategy for re-aligning our practices and ethical concerns for the next phase of human history, the Anthropocene." The Anthropocene, a yet to be endorsed title for the current epoch in Earth's history views the human species as an earth-changing force equivalent to a geological processes (Crutzen 2002).

Figure 4.1 Nature with a Big N, paper bag, Natural History Museum, London. Photo: Fiona Cameron 2013

My concern in this chapter is directed toward reworking climate change narratives in museum exhibitions in light of the rethinking of modernity's relations with nature. I draw on the exhibition *Atmosphere: Exploring Climate Science* at the Science Museum, London as a case study to illustrate how we might compose climate change narratives differently that draw on

post-human proposals. My choice to focus on a climate change exhibition narrative is first due to the undeniable, persuasive power of the museum as an authoritative pedagogical apparatus, and second as an opportunity to explore the logic that underlays our interface with the nonhuman world. The museum's authoritative position as a trusted information source on the science of climate change second only to science research institutions (Cameron 2012) gestures toward the important role institutions can play in rewriting and communicating new narratives of climate change and environmental issues more generally.

To do this work I draw on a range of post-human and new materialisms proposals (Bennett 2010; Deleuze and Guattari 1987; Descola 2013; Latour 2013; Morton 2013). I explore the potential uses of these relational and processual approaches for collapsing Culture/nature dualisms; for individuating big Nature; for detailing ways we can be more attentive to the folded, material, entangled and embedded relations between humans, nonhumans and earthly processes and how they might inform the development of new social collectives for a more-than-human world.

THE ECOLOGICAL CRISIS AND THE PROBLEM WITH NATURE

With the emergence of the ecological crisis, philosopher Slavoj Žižek (2008) provocatively casts "Nature" as the "opium of the masses." In doing so Žižek alerts us to the disturbingly persuasive power of Nature as a metaphor for defining the modern world and all nonhuman others, and to the significant political and ideological authority it commands. Cultural geographer Eric Swyngedouw (2010, 4) also draws our attention to how Nature's solid supposedly discernible form operates as a horizon from which action can be mobilized, directed and legitimated and provides "an anchor for ethical or normative judgments of ecological, social, cultural, political, or economic procedures and practices." Anthropologist Bruno Latour (1993), Žižek (2008), Swyngedouw (2010) along with literary scholar Tim Morton (2008) declare that "Nature does not exist!" each proposing to dump Nature all-together. The case for dumping Nature according to Morton (2008, 24) is due to its power and the way its functions ideologically ". . . foreclosing thought, disavowing the inherent slipperiness of the concept, and by ignoring nature's multiplicities, inconsistencies, and incoherencies."

Swyngedouw (2010, 3) explains the problem of nature as a metaphorical one which fails to individuate nature as a series of independent things and as multifarious hybrids of the human and nonhuman when he writes; "Nature as metaphor remains empty; its meaning can only be gleaned from metonymic references to other, more ordinary signifiers. Swyngedouw instead lists the 'content' of Nature as olive tree, parrot fish, SARS virus, love, reproduction, the Alps, mineral water, markets, desire, profits,

CO_2, money, competition, that all collapse Nature into a series of different things, some more nature and others as more culture, as natural/cultural hybrids thereby disavowing time-honored borders of segregation. Such metonymic lists also undermine Nature's durability and consistency, [AuQ5] thereby casting nature as uncertain and unstable. For Morton (2010, 3) Nature also fails because of its "unnatural qualities of hierarchy, authority, harmony, purity, neutrality and mystery." Collapsing Nature not only acknowledges these multiplicities embodied within a discredited Nature as I suggest as an array of coordinates, but also their radically and infinite heterogeneity of collectives (Braun 2006; Castree 2003; Colebrook 2012) that they form.

The essence of Swyngedouw's argument is that Nature as an empty signifier and as a non-individuating term seeks to encapsulate all ordinary signifiers of things, of the nonhuman, of the more than human as well as hybrids of the human and nonhuman and render them invisible under the aegis of Nature with a big N. In doing so the concept of Nature prevents us from ecologizing and effectively dealing with the contingent socio-natural dynamics and processes that make up climate change because the "things" that make up Nature are seen as solid, non-individuated, nor are they rendered relational.

Big Nature also fails to account for the richer ecosystems (Latour 1998; 2013, 10) and the diverse range of coordinates that must be taken into account when dealing with the ecological crisis. The coordinates that make up Nature are accordingly not given their own agency due to the prevailing commitment to the Human/subject position from which research and action originates.

It is not just the problem of big Nature and the need to individuate its components but also how Moderns situate Nature in relation to culture, and how dualistic relations between Culture and Nature operate in the modern imaginary as a position in which to conceptualize the ecological crisis and as source of inspiration for promoting action. In *We Have Never Been Modern,* Latour (1993) argues his case for dumping Nature by contending that there is neither Nature in itself and for itself and neither society or culture exists. In doing so Latour (1993) urges us to collapse distinctions between Culture/nature citing that this dualism never existed and therefore we have never been modern. In his latest book Latour (2013) qualifies his previous musings arguing while we may have never been modern, we have thought of ourselves as modern. Taken together the modern hubris relation between Humans and nonhuman others and an all-encompassing Nature together forecloses effective ways of dealing with the ecological crisis because it ignores nature's multiplicities, fails to adequately account for natures' interdependent and nonlinear activity and the radically and infinite heterogeneity and entanglements of human, nonhumans and material processes that make up the worlds we inhabit Swyngedouw (2010; see Bingham and Hinchcliffe 2008).

This belief in the modern binary of Culture/nature has not only stifled attempts to put the human governance of climate change in its proper relation with the nonhuman but more importantly has inspired specific actions that position the human as the sole source of action founded on the manipulation, domination and control of the atmosphere.

As a modern humanist institution, the museum has promulgated the Moderns prospectus in this regard most visibly through the promotion and the assembling of Nature through its collecting, research, documentation and exhibition practices and by relying exclusively on hubris accounts of Human/object as a position for accomplishing these tasks. If Nature doesn't exist and the separate worlds of Nature and Culture are a modern fabrication, then we have a problem; and it's a big problem for museums founded on big Nature and Culture/nature dualisms.

The problem with Nature and the dualistic divisions of Culture/nature can be traced back to French philosopher Rene Descartes (1641, 2009). Descartes is famous for establishing what we now know as Cartesian rationality, a philosophy that has been used by Moderns to define the world according to two distinct and separate substances, the mind as an immaterial substance whose essence is thinking and the body as material, physical things. Descartes's division between Mind/body set up a series of practical divides between the mind and the material world articulated as Human Subject/object and subsequently as Culture/nature. This division founded a humanist philosophy and a dualistic metaphysics where the world came to be thought of as two distinct and different substances: immaterial, mental things (human minds, ideas) and material things (matter, bodies and nonhumans). The establishment of the world of humans and the world of nature as two distinct entities became entrenched and identified with Enlightenment thought and formed the basis of our relations with the nonhuman world in museum representations of Culture and nature.

In his deconstruction of the modern project and Cartesianism, cultural theorist Richie Nimmo (2010) situates the mind as the organizing center of modernity. The mind as the seat of intelligence according to Nimmo (2010, 3) "spiritualises modern, human life and practice while at the same time reifying materiality, all that is material and nonhuman by separating the latter from life and practice, rendering nonhuman things inert and abstract and therefore objective in Cartesian thought." To be modern, according to Nimmo (2010, 1), "is to have a particular anthropocentric view of the universe and existence itself." Culture becomes the mind/thinking as subjectivity collectivized, the formula on which modern human-centric perspectives and the separate and unequal worlds of humans and nature emerge. Cartesian Culture/nature advances the modern constitution and its humanist perspective that has in turn led to quite specific ways we formulate our knowledge of things; our experience of climate change as an exclusively human project; and figures the atmosphere as a thing that humans can objectify, understand, rationalize and control. Consequently our knowledge

of Science and of Nature, for example, as an object of inquiry becomes unreflexive, dualistic and objective.

These substance dualisms and modern humanism, I contend, are most starkly visible in the museum philosophies and practices as hierarchical divisions between Culture/nature; Human/object or Museum/object. The object according to this rationale becomes all animate and inanimate things that are not classified as human.

Moderns have not only set up this duality as an anthropocentric view of life, but humanist ontology also founds knowledge on the hierarchical orderings of the natural world made by humans themselves, figured on the basis of the possession of uniquely human characteristics, notably the ability for rational thought (Hall 2011, 375). The dualism of Culture/nature also operates as a scaling mechanism where, according to political theorist Matthew Hall (2011, 375), "lower in the hierarchy of mind and presence, plants and animals were presumed to have no purpose of their own and so their existence is entirely subverted to human ends . . ." To serve human ends Hall (2011, 386) explains "plants, animals, soils, sky and rocks are portrayed as insensitive, un-minded and passive." In doing so this modern relationship has unashamedly disrespected and exploited the nonhuman world, and elevated the human above others as a unique, entitled species. The sudden proximity to nonhuman others and to earthy processes brought about by the ecological crisis must now be recalibrated. In the context of the ecological crisis, the dismantling of Nature and dualistic thinking, the museum is therefore challenged to rethink its modern Western theology.

ATMOSPHERE: A MODERNIZING PROJECT

The exhibition *Atmosphere: Exploring Climate Science* opened in 2010 at the Science Museum, London. Heralded as the cutting-edge exhibition on the science of climate change in the world, the exhibition's content is divided into five zones dedicated to different aspects of climate change. Individual sections are organized according to themes: how the atmosphere works; the history of climate research; greenhouse gases, the carbon cycle; adaptation to climate change and effects on Earth systems and global communities; mitigation solutions instituted through economic measures such as carbon markets and science and technological solutions from large-scale geo-engineering projects that seek to extract carbon from the atmosphere and carbon capture and storage to new energy options such a hydrogen cars.

When searching for explanations on something as serious as climate change, Professor Chris Rapley, the director of the museum, firmly places big Science as the savior of a now-threatened human race and as the discipline that can secure the future sustainability of the planet. In doing so

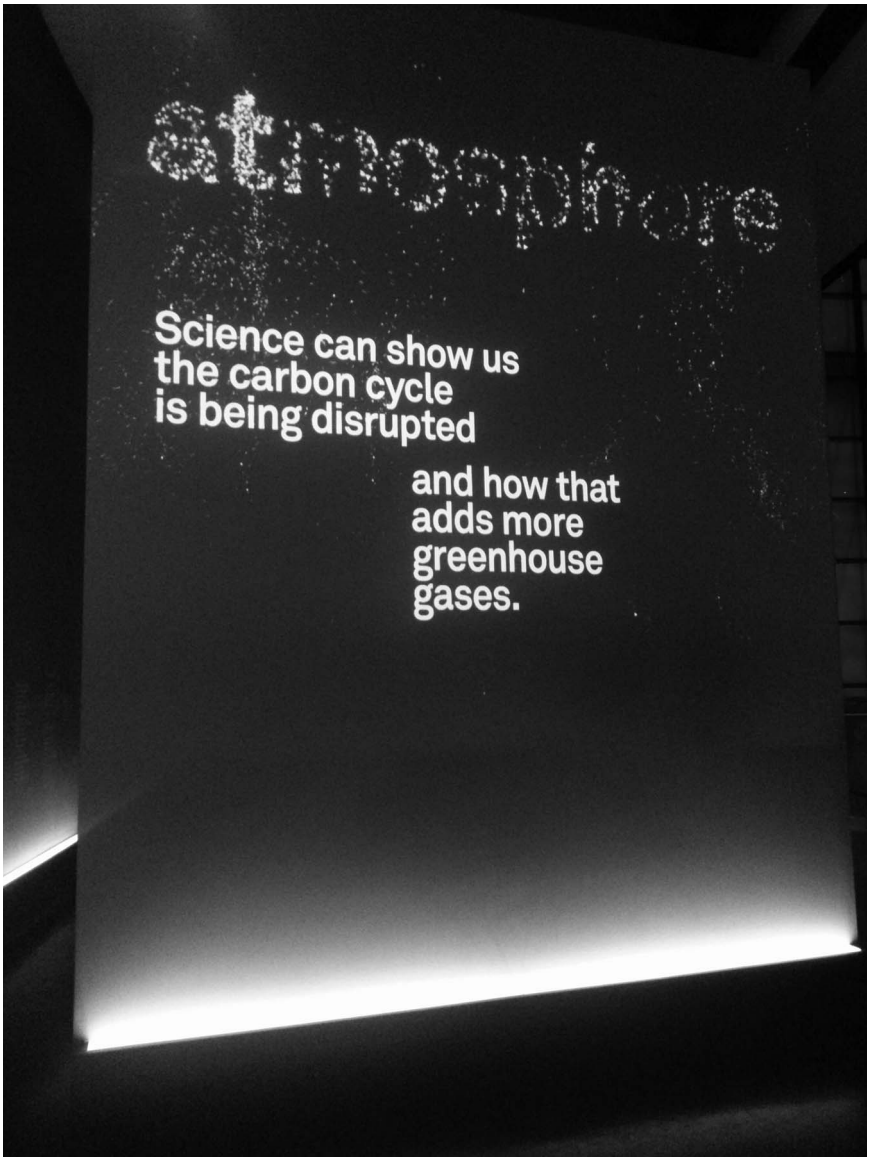


Figure 4.2 Entry wall, *Atmosphere*, Science Museum. Photo: Fiona Cameron 2013.

Rapley position's himself, the museum and the Earth's population as reliant on the institution of science as the only form of valid knowledge that can reveal how the Earth's system works and therefore as an optic to make decisions about the future for ourselves and the nonhuman world (see Latour 2013). By levering big Science, the Science Museum is therefore confirming

its commitment to a normative modernizing project in the introductory panel detailed below:

> Understanding what the science is telling us is crucial to making the right decisions, given the need to balance major costs and risks. Our aim is that *Atmosphere,* will provide our visitors with accurate, up-to-date information on what is known, what is uncertain, and what is not known . . . and the ways that science, technology and industry can contribute to a positive future.(*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

The first step in my analysis and reworking of climate change narratives is to explore how the Modern thesis is played out in accounts of climate change and its governance in the *Atmosphere* exhibition, and the particular values, attitudes and ways of acting in the world modern humanism inflects.

THE AUTHORITY OF MODERN SCIENCE

> Science can show us that greenhouse gases are increasing and why that makes global temperatures rise. . . . Science can show us how Earth's climate system works and what causes the damage. . . . Science can show us what's already changing . . . and what might happen next. . . . Science can track what's already changing and help us imagine the future. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

In the museum's articulation of the role of science in the governance of the climate problem, complete confidence is given over to scientific reason as a set of disciplines that is able to reveal the workings of an already pre-existing climate system that Moderns, and indeed all populations on Earth, need to be recalibrated with. Climate change and its governance therefore becomes an issue of Science because it deals with Nature and therefore has the authority to speak for the nonhuman world. Latour explains scientist's authority to speak for Nature when he says:

> Natures are present but with their representatives, scientists who speak in their name. Societies are present, but with the objects that have been serving as their ballast from time immemorial. (1993, 144)

In this instance the atmosphere acts as the ballast on which societal action on climate change is based.

While there is an acknowledgement that Science doesn't have all the answers as a qualification to the authority the curators advocate for at the entry of the exhibition, it is seen as a discipline that can be used to understand Nature: "Science doesn't have all the answers, but it's a powerful way to make sense of this incredible and complex planet."

In doing so, *Atmosphere* talks of a pure Nature, as a non-individuated Nature where the social is seen as distinct rather than as a series of hybrid systems entangled with human designs.

Therefore the underlying scientific rationale informing the means to govern climate change in *Atmosphere* is that Science can make discoverable, objective facts that are socially and politically neutral. It can adjudicate between competing claims to truth, and can determine the causes of climate change and climate sensitivity (see Hulme 2009, 73).

Finding an answer through Science that *Atmosphere* supports alone is seriously misguided. It engenders unrealistic expectations about what can be achieved. It further perpetrates the belief according to cultural geographer Mike Hulme (2009, 73) "that science can calculate and produce definitive statements about what is and what is not dangerous for societies, and accordingly ways to solve the ecological crisis."

IMPACTS AND SOLUTIONS: THE WORLD OF CULTURE/SOCIETY AND THE WORLD OF NATURE

While *Atmosphere* does acknowledge the enormity of the impact industrial societies have had on the ecosphere, human impacts as expressed through exhibition narratives and images continue to promote human activities as outside Nature. In doing so, *Atmosphere* quintessentially separates the human from climate change and the nonhuman world both in the articulation of the problem and the suite of solutions that modernity proposes (see Head 2012, 700). Narratives explain Earth as a complex system able to be understood through Science: "The Earth's climate is very complex, but scientists need to understand how it works." . . . "Changing one part of our interconnected planet affects the whole system" (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010). The atmosphere is therefore articulated as a complex biophysical system comprising components of Nature alongside earthly processes:

> Everything on Earth plays a part in creating the climate
> . . . the Sun's energy
> . . . the movements of the atmosphere
> . . . even the land and oceans, vegetation and ice.
>
> (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Here Nature is individuated as rocks, oceans and plants as either carbon producers or as absorbers. Other natural actants include El Niño and the Sun's output:

> Warm ocean water, decaying plants, breathing animals and erupting volcanoes all release greenhouse gases into the atmosphere. Greenhouse

> gases are also removed from the atmosphere at different rates by oceans, rocks and as plants grow on the land and sea. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

While the exhibition gestures toward the entanglement of human-induced and natural warming through statements such as: "Looking at the pattern of warming suggests it is linked to our carbon emissions" it does not completely reconcile the two systems of Culture and Nature. Rather, when articulating the role of humans in human-induced warming there is a shift from a discussion of climate change as biotic complexity to narratives of linear cause and effect when discussing human activities:

> The world is warming, and most scientists have concluded that human activities are the cause. . . . Some activities increase the concentration of some greenhouse gases in the atmosphere—most importantly carbon dioxide and methane.
>
> These gases enhance the natural greenhouse effect which prevents some heat from escaping from the atmosphere, warming the world. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

In doing so, *Atmosphere* continues to present the world as a biophysical system through big Science and Culture as two separate systems—natural warming and human-induced warming. The continued promotion of the two systems, of Nature and of Culture/Society fails to acknowledge what Will Steffen (2009) argues as the shift from the Earth as a biophysical system to a socio-biophysical system as a result of the impacts that modern industrial society has had on earthly processes. These discourses gesture toward a conceptual gap between Cartesianism as a philosophy, practice and as a worldview, and the dramatic and undeniable evidence of climate change as a socio-biophysical process.

These narratives also draw on quantum physics as a way of understanding and animating the various things we collectively call the atmosphere. Narratives, for example, cast the atmosphere solely in terms of the material substance of matter and as particles comprising nitrous oxides, methane, carbon dioxide, water vapour and as molecules and atoms. In doing so the exhibition narrative alienates the nonhuman. "Nature is over there, alien and alienated" as eco-critic Timothy Morton (2010, 5) suggests, and therefore is "not us, not part of us." Science and technology are seen as the instruments that can bridge, attend to and respond to the gaps between society and the natural world: "Science and technology can help us respond to the challenges. . . . What are our options for tomorrow?"

[AuQ6]

Understanding the atmosphere is reconciled through the ecological monitoring of Nature. The global monitoring of Earth's sea surface and

Figure 4.3 General view of the *Atmosphere* exhibition. Photo: Fiona Cameron, 2013.

near-ground temperatures is achieved through robotic floats and other devices to extrapolate long-term warming trends:

> How do scientists know the Earth's climate is changing?
>
> Monitoring long-term climate change depends on the bringing together of highly accurate comparable and stable measurements collected from across the globe by a variety of different organisations . . . Thousands of measuring devices are at work on land, on sea, in the air and out in space.(*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Science discourse acts as a script that directs human action and thought. Hubristic narratives predominate on the basis of the Culture/nature as Human Subject/object relation where humans command and control, measure and model the atmosphere as the focus for intervention.

These divisions disable the means to govern and mobilize action on climate change more purposefully because it separates us from and discounts the nonhuman world, and fails to adequately acknowledge our entanglements with the nonhuman world together as agentic forces.

In the exhibition, collections are put to work to stand for and represent the effects of climate change on Nature as a passive object each working in the service of science and scientists. Objects act as undeniable empirical evidence of warming trends and therefore as a ballast and stabilizing force for confirming Modern discourses of climatic change. A section of a tree ring operates in modern climate change speak as a climate diary where variability is etched into their tree grown rings. Likewise ice, particles of dust, plants and animal skeletons act as records of past warming. In doing so scientists and curators speak for the nonhuman, rendering "things" as passive, having no agency of their own except when put into service to support these Modern ends. The nonhuman animal, cows in this instance, are seen as unminded bodies subject to bio-political compliance. Here the human task to manipulate cow's diets to reduce greenhouse gases.

BIO-POLITICAL COMPLIANCE AND ECOLOGICAL MODERNIZATION: A VISION FOR THE FUTURE OF LIFE ON EARTH

The means to govern climate change in the *Atmosphere* exhibition focuses on bio-political policing (the monitoring of human bodies and their carbon burning practices) and the reduction of C02 emissions. Governance occurs through various apparatus such as carbon taxes and new technologies operationalized through human will and intentionality as technical and scientific knowledge.

The separation of Society and Nature as a lever for governing interventions through bio-political compliance and ecological modernization is promulgated through the notion of humans as subjects and Nature as the object to be controlled, as part of the natural order of things. Nature therefore becomes a background subject mediated through human subjectivity.

These narratives do not consider the nonhuman as a coordinate of governing except as a function or instrument put to work to serve these ends. In doing so, mitigation options make visible a narrow suite of mitigation solutions aimed at reducing greenhouse gases through targets and limits and marketing mechanisms such as taxes and trading schemes, and through techno-centric investments and interventions destined to command, capture and harness nature's resources such as solar and wind power:

> Can science and technology help tackle climate change?
>
> Reducing greenhouse gas emissions in a socially acceptable way requires scientific and technological ingenuity. Cutting-edge solutions will be both global and local in scale with innovation centred on the key sectors of power generation, transport and energy use. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

The future for humanity is articulated through technological investments in alternative energy sources including biofuel, electric, hydrogen, wind and solar power and measures that ensure improved energy efficiency. Futurist technologies include for example artificial trees designed to remove $C0_2$ from the atmosphere.

Other mitigation approaches are framed on the basis of hubris where Moderns command and control the nonhuman and earthly processes through technology with a big "T" such as carbon capture and storage:

> Tackling global warming by deliberately manipulating the Earth's system will rely on finding practical, affordable methods for capturing carbon dioxide. This technology could let us keep burning coal and gas but without most of the carbon dioxide emissions. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Hubristic games, for example, ask the visitor to limit heat energy by blocking greenhouse gas particles to ensure Earth's average surface temperature remains suitable for life.

Bio-political compliance directed at individuals and corporations mediated through carbon taxes and emissions trading schemes is akin to policing not only of human and nonhuman bodies and their carbon burning habits but also through the administration of ecological domains, notably the atmosphere. Individuals and corporations are not the only entities subject to bio-political policing. The Science Museum presents itself as a responsible carbon citizen by calibrating its activities in terms of carbon content:

> How can you create a gallery to inspire hundreds of thousands of visitors—and tread lightly with your carbon footprint at the same time?
>
> With the help of experts we've traced the carbon emissions that lie behind many different items. We've considered the energy they will use . . . how long they will last and be disposed of. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

All these solutions continue to support the modern project without adequately addressing the wider social, economic and political relations that contribute to them (see Adger et al. 2001).

Modernity's tools, technologies and capital therefore become the lever for action for the governance of climate change. Nimmo (2010) calls this assemblage of tools, capital and technology as instruments central to a secular form of theology where humans become "their own God" and therefore the dominant organizing paradigm for governing in the developed world.

Narratives regarding the means to govern gesture toward current climate change governance strategies as Swyngedouw (2010, 20) argues merely as a series of "scripted techno-managerial dispositifs, often portrayed as radical or innovative, that must assure that 'civilization' as we know it can

continue—it calls for a revolution without revolutionary change." The exhibition's underlying message is "change our energy sources and it is business as usual," thereby solidifying liberal, ecological modernization discourses. In doing so the exhibition acts as a microcosm of global debates on how to best govern climate change:

> How easy would it be to cut carbon dioxide emissions?
>
> The power generated by burning fossil fuels is integral to our way of life. So making rapid emissions cuts would have substantial implications for human infrastructure and society. Instead governments are weighing up the costs of cutting emissions against the costs of adapting to the likely impacts of climate change. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

In sum, a preoccupation with governing the atmosphere, the thesis this exhibition promotes, is an unfortunate outcome of modern ways of thinking and acting in the world.

THE MYTH OF STABILIZATION AS A HORIZON

The dramatic and overwhelming empirical evidence of climate change gestures toward multiple, relational and agentic thinking as more consistent
[AuQ7] with its verifications (see Head 2008). Climate science as a scientific discipline, however, predominately works with climate change as a complex biotic system involving the entanglements of many actants such as coal, the oceans, land, carbon dioxide and the atmosphere as highly unpredictable forces of their own. Indeed such thinking forms the basis of climate-sensitivity testing that seeks to ascertain how response climate temperature is to radiative forcing through analyses of greenhouse gas concentrations. So why, in the case of climate change and it's governance in the social and political realm, and as detailed in this exhibition in discourses of the social, is this biotic complexity involving nonlinear processes, contingency, threshold, instability, unknowability and surprise lost? To what extent are human actants included in these complex feedback systems?

Predictive scientific modeling works on the basis of the complex modeling of biotic factors and inputs that try to ascertain future emission scenarios levels (IPCC 2007). In these accounts the desire to securitize human futures is articulated solely in terms of modeling future emission scenarios and their effects on the biotic system through computer programs:

> Climate models . . . are great tools for scientists to learn more about how the Earth's climate works. . . . By putting together information about each of these, using data, equations and powerful computers, scientists can build a mock-up—a model—of the climate. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

The modeling of higher levels of greenhouse gases provides the key to future action. In these terms the future for humanity is predicated on a greater ability to control the atmosphere through more and better science and computers. The influence of human actants are restricted to anticipated emission scenarios:

> Climate scientists are currently using computer models to help predict what might happen in different parts of the world . . . they provide useful information about how the planet might respond to higher levels of greenhouse gases in the atmosphere . . . with increased science knowledge and more powerful computers they're getting better and better. . . . Controlling the atmosphere is possible with more accuracy with better science and technology. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Climate modeling and future forecasting is expressed in a hubristic game inviting the visitor to "Choose a person and use the climate modelling tools to help them understand what might happen where they live in 2100." This drive toward greater precision and a greater control of the atmosphere is used as a script to articulate impacts and, therefore, adaptation strategies:

> "Looking at climate predictions shows the possible impacts on our lives." "Looking at studies around the world shows many things are changing as predicted." "Looking at models of the future shows how the climate might change.(*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

The removal of biotic complexity in the translation of science into the policy context and the public domain produces more simplistic, linear and reductionist accounts that are then put to work to support discourses that seek to restore balance and stabilize a greenhouse gas base-line. Climate science, economics and policy making therefore co-conspire Swyngedouw (2010, 9) argues "to support a climate stabilization discourse aimed at meeting a predefined stabilized temperature and concentration target to which international negotiations are directed." The obsession with a singular Nature and stabilization narratives is in Swyngedouw's (2010, 11) words sustained by "a particular 'quilting' of Nature that forecloses asking political questions about immediately and really possible alternative socio-natural arrangements." These discourses all insist on the existence of Nature's innate stabilizing force as one that has been disrupted by an external human agency. This premise is explained in a pedestal exhibit that talks of Earth's energy balance:

> Science can show us how the carbon cycle is being disrupted.
>
> Changing the levels of greenhouse gases changes the Earth's energy balance.

> Changing the carbon cycle changes the levels of greenhouse gases in the atmosphere.
>
> The Earth's surface temperature depends on the balance of the energy received from the Sun and energy lost from space. A natural mechanism called the greenhouse effect plays a major role in this process. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

In ecological modernization projects, for example, the rationality that drives this account fails to give an adequate explanation of the nonlinear ramifications and interpenetration of human activities and the atmosphere and between technology and nature except from a hubristic point of view.

The notion of climate change as a defined object to which projects that attempt to stabilize the atmosphere can be directed using tools such as computers, bio-political compliance and the routine conceptual frameworks we have come to rely on is challenged by cultural theorist Timothy Morton (2010). Drawing on the work of climate scientists, climate modeling and mathematics Morton describes climate change as a "hyperobject" thing that we have created for ourselves that disrupts normative views of what an object is and ways we can deal with it. Climate change, he argues, stretches our concepts of space and time that far outlasts our human time scale; is massively distributed in terrestrial space; is unavailable to immediate experience and therefore pushes our conceptual frameworks to the limits (2012). He challenges us to seek some other basis for making decisions about a future to which we have no real sense of connection, rather than relying on modern tools such as computer modeling, technology and carbon markets. To do so Morton (2013) urges us to construct some non-self-ethics and politics to deal with what he calls "pernicious hyperobjects."

[AuQ8]

THE DEMON CARBON

The key actors that are already present in the exhibition's climate change science narratives are Carbon, Science and Technology. Many more actors or actants are rendered invisible. By restricting the coordinates of governing to carbon, economics, technology and science, and accordingly to human apparatus bio-political compliance and technocratic solutions the, curators reiterate these practices as the only viable means to govern. In these terms the target of concern, the "demon carbon," becomes the climate question. Visitors to the exhibition are told to cut carbon: "Cut the Carbon. Can you reduce the world's greenhouse gas emissions by 2050?" (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

While carbon is acknowledged as a natural element in all things, humans are charged with disrupting the balance of the carbon cycle: "Science

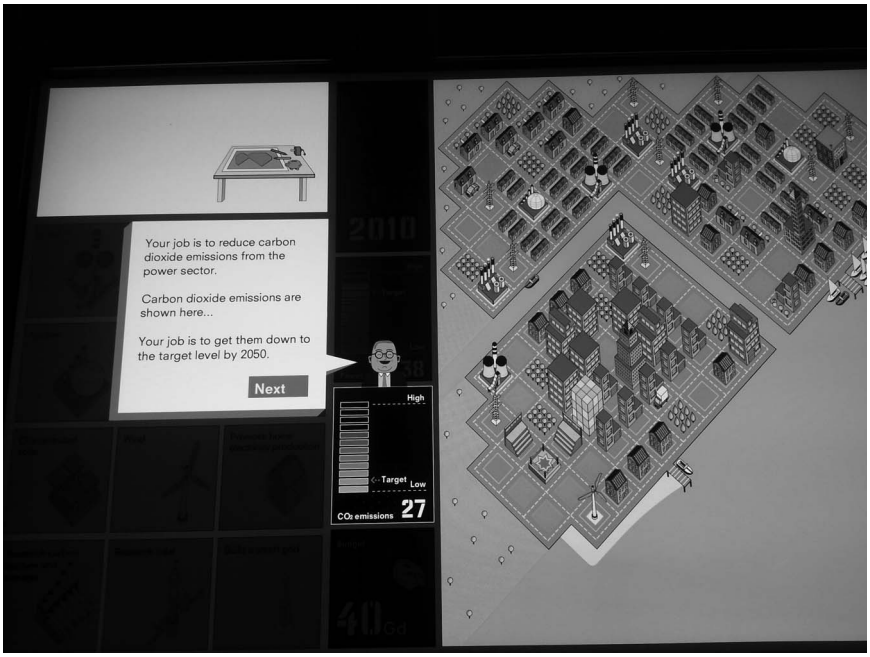


Figure 4.4 *Cut the Carbon* theme panel. Photo: Fiona Cameron, 2013.

can show us carbon's global pathways and how we're causing them to change . . ."(*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Interestingly carbon is described as an active agent in the climate system but when talking about climate change and the human, carbon becomes a passive element as something to be controlled through human intervention according to a simplistic, linear equation of carbon reduction and the restoration of equilibrium: "We can reduce emissions and restore equilibrium."

Energy options are discussed solely in terms of their carbon content. Nature, wind, waves and sun are harnessed to power humanity:

> The energy our planet receives from the Sun causes large-scale circulation in the atmosphere and the oceans, generating wind and waves. Harnessing these types of energy could be a low-carbon way of meeting the world's energy needs."
>
> Experts calculate that well-planned combinations of low-carbon technologies, together with large-scale battery storage and power exchanges between countries, could replace fossil fuels and provide human society with reliable power. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

The consensual mobilization of empty signifiers such as Nature and stabilization in global climate change and environmental discourses as Swyngedouw (2010, 11) writes "contribute to and re-enforces the forging of what he calls a post-political or post-democratic configuration and condition . . ." characterized by more coercive means of policing and carbon control." Narratives are fixated with targets and timetables (Boykoff et al. 2010, 58) founded on the belief that the climate system can be stabilized to an imagined safe and secure stable level. A game, for example, asks the participant to teleport themselves to 2025 and start reducing emissions, therefore challenging the participant to cut emissions by 50% by 2050.

Unsurprisingly, climate stabilization as a framing concept has directed the means to govern at a global level toward the manipulation of emissions and the static quantification of the equilibrium response while rendering other ideas and approaches relatively invisible (Boytoff et al. 2010, 61).

For example another hubristic interactive game asks the participant to reduce greenhouse gas emissions in power production, transport, farming, forests and buildings by 2050. Looking down, the participant commands and controls the atmosphere:

> Scientists calculate we need to cut global emissions by 50% or more from 1990 levels by 2050 to have a reasonable chance of reducing the risk of severe impacts of climate change. Should we start now? Or should we wait to give technology time to develop? Even if we had the same technology as we do today, we may have more money or a better plan in the future. (*Atmosphere: Exploring Climate Science*, Science Museum, London, 2010)

Climate science must therefore be considered as one approach as part of a suite of historical disciplines, entangled with the political and as just one of many governing methods informing climate change action and public policy debate. As a knowledge practice Science, according to Mike Hulme, will always be partial, conditional and uncertain (Hulme 2009). Clearly there is a mismatch between the emergent realities of climate change as unpredictable forces and the uses of Science in popular, political and museum discourses.

Through institutionalized storylines, as in the case of this museum narrative, Boytoff (et al. 2010, 59) concurs "climate stabilization discourse has solidified and reproduced itself." In this narrow, reductionist mitigation paradigm guided by science and economics, the coordinates of governing in *Atmosphere* and the technical means to govern are restricted to a closed system comprising carbon, greenhouse gas emissions, targets, international agreements and protocols such as Kyoto, behavior change, cost-benefit analysis, climate science and market mechanisms such as carbon taxes and emissions trading schemes. Yet this linear and simplistic policy discourse

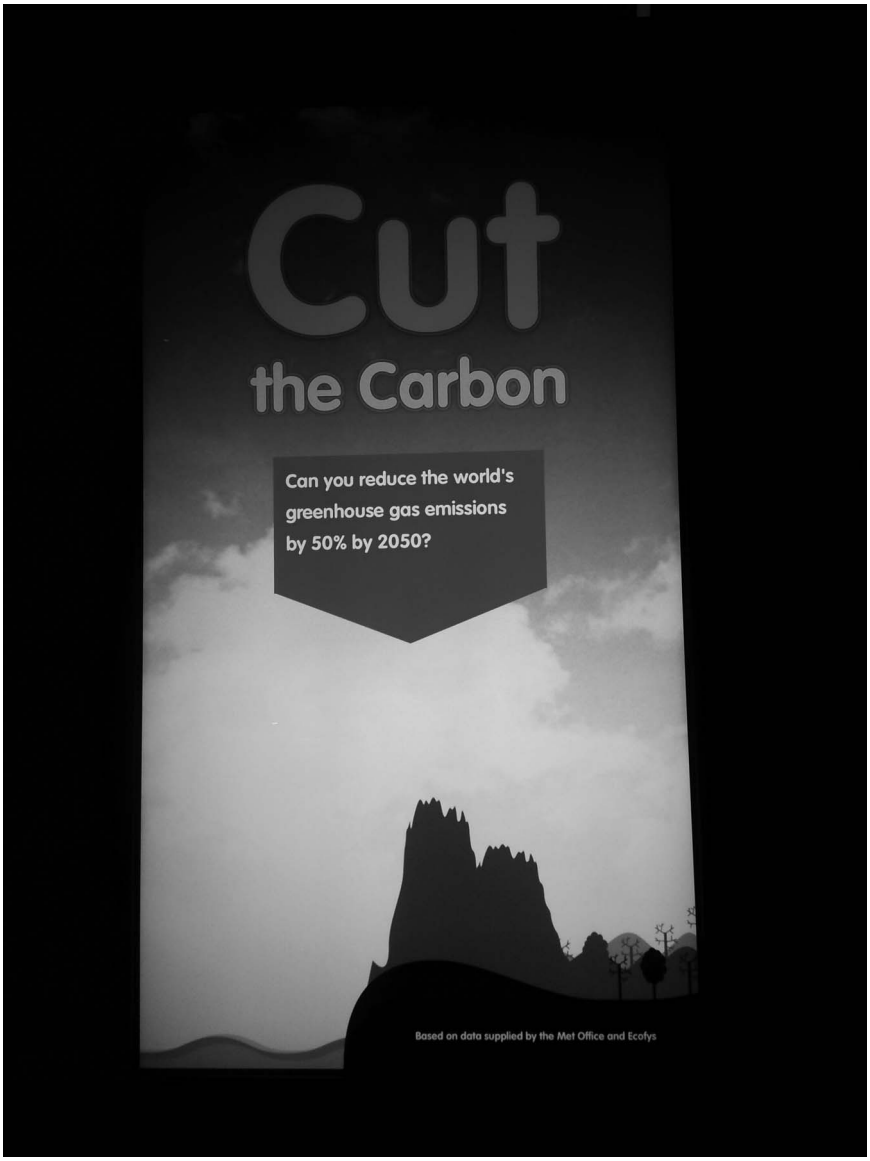


Figure 4.5 Hubris game challenging participants to cut emissions by 2050. Photo: Fiona Cameron, 2013.

has been consistently undermined by "potentially troubling and unstable biophysical processes that signal indeterminate and irreducible outcomes" (Boykoff et al. 2010, 61). Such observations gesture toward the need to take a broader range of system coordinates into consideration, each with

their different impulses, metabolisms and effects. The politics of climate change governance is predicated upon the fallacy of a singular, originally harmonious Nature, one that is now out-of-synch and, if the "demon carbon" is properly managed through a series of technological, managerial, and organizational solutions, then life can be securitized again (see Swyngedouw 2010).

In summary, the prevailing normative messages and the attitudes, values and modes of thinking this exhibition inflects center around six key messages;

1. Science and technology has the answers for the future of the planet;
2. Carbon or C02 is the climate question and reducing our carbon footprint is the sole and most effective response and course of action;
3. Technological investments in alternative energy sources can securitize human life on Earth;
4. Capitalist economies and economic growth can continue in a business as usual fashion if alternative energy and cleaner sources are made available;
5. The atmosphere can be controlled if put back into balance;
6. Climate science is factual and apolitical.

REWRITING NARRATIVES OF CLIMATE CHANGE

New knowledge practices are emerging in the environmental humanities aimed at comprehending and formulating culturally intelligent ways to rework the modern constitution, Cartesian dualistic views on the world, modern humanism and work more effectively with contemporary dynamics and circumstances as a way of promoting a sustainable planet for the long term. For the purposes of climate change action these new ontologies collectively break Nature/culture and hubristic views on the world; rework these binary concepts as relational and processual; fold the material and discursive as complex socio-physical processes and systems; decenter and reposition the human in new polities and view humans as just one species among many; dismantle old Nature and rework Nature as individuated animate and inanimate things each with their agency (Bennett 2010; deLanda 2006; Deleuze and Guattari 1987; Descola 2013; Harvey 2007; Hodder 2012; Ingold 2011; 2012a, 2012b; Latour 1993; 2005; 2013; Law 2012; Morton 2008, 2012; Thrift 2008; Urry 2003).

In the second part of this chapter I propose to ontologically refashion modern narratives of climate change embedded in the *Atmosphere* exhibition according to post-human thinking.

REWORKING BIG NATURE AND EXTENDING THE RANGE OF GOVERNING COORDINATES

My first task in the ontological refashioning of narratives of climate change governance in the exhibition is to dump big Nature, the notion of the atmosphere as an object of intervention, individuate Nature's components and collapse distinctions between Culture/nature. By collapsing and discrediting modern Nature and the atmosphere as the dominant paradigm to direct action, we open up an ontological space to consider an array of "things" that make up governing collectives that were previously rendered invisible and passive.

Climate change governing coordinates directed toward the control of the atmosphere are therefore no longer restricted to, nor founded solely on, a modern constitution and its restrictive metonymic list of signifiers representative of the scientific, technological, economic and the political directed toward controlling human C02 emissions. Rather, governing must include a practice that remains attentive to a full range of actants from the human, more-than-human world, the radically asymmetrical hybrid things and earthly processes that were all previously categorized and collapsed into Nature. The coordinates of governing and the means to govern become and involve all these things, which in turn collapses distinctions between Culture and Nature. The atmosphere as an entity "over there and outside of us" rather is in communion with us and becomes part of us.

The atmosphere and its coordinates of governing in a world where distinctions no longer exist comprise of a collection of actants such as water; clouds; nitrogen; oxygen; carbon dioxide; coal; lifestyles; legislation; radiation; heat; gravity; profit motives; electrons; electricity; climate science; computer modeling; economic theory; carbon taxes and emissions trading; pollution; coal fired power stations; trees; energy policy; ideologies; rationalities; technologies; beliefs; thoughts; desires; consumption; small island states; malaria; cyclones; oceans; ice; United Nations Framework on Climate Change and nation states. All these things have powers and forces with trajectories, intensities, propensities or "tendencies of their own" (Bennett 2010, viii). Each of these coordinates from social actors such as scientists, rationalities, legislation, economic theory and climate science as hubris management strategies, human and nonhuman machines such as coal fired power stations and earthly processes such as gravity operate simultaneously as social/cultural and natural/physical processes. They are rarely, if ever, fully Nature or fully human. The world instead is filled with heterogeneous collections of human and nonhuman things, continuously multiplying nature-culture hybrids (Clark 2011) and a "multitude of existing, possible or practical socio-natural relations" that may emerge from these different entanglements (Swyngedouw (2010, 11). The coherence of these actants in climate change governance is predicated upon the

assembled networks of human and nonhuman relations in processes of co-constituted action, rather than as the functional parts of nature that makes up Nature with a big N, and in this case the atmosphere with a big A, to which action is directed in a linear fashion. The atmosphere is a singular entity, as an organizing logic in the governance of climate change according to a simplistic logic of cause and effect as a means to achieve stability is therefore no longer productive.

Establishing a system of diverse governing coordinates as a new type of ontological politics in exhibition narratives has the potential to help us to think differently about climate change and governance. Enrolling other governing coordinates even as signifiers, as this experimental work essentially does, establishes a new fluid political ecology for a climate changed world. Politics can no longer be restricted to humans. Events and phenomena previously traced solely through linear accounts of human actions are no longer sustainable. Having said this, capturing the full range of governing coordinates and their operation as part of a complex and nonlinear system can never be complete because the influence of others cannot be fully known or visible. As signifiers it must be acknowledged that this expanded range of coordinates merely acts as another way of representing the world as an approximation to the real world (see Woolgar and Lezaun 2013) and will therefore retain a certain distance from, as Swyngedouw (2010, 16) says, "the Real of natures." Real natures, Swyngedouw (2010, 16) explains, are complex, chaotic, often unpredictable, radically contingent, historically and geographically variable, risky, patterned in endlessly complex ways and ordered along "strange" attractors (see, for example Prigogine and Stengers 1985.

By proposing a different system of coordinates for climate change governance we must also revise to whom and with whom we must negotiate (Latour 2010, 483). It is abundantly clear that human and nonhuman destiny is entangled.

NEW SOCIAL COLLECTIVES FOR A MORE-THAN-HUMAN WORLD

The richer ecosystem of coordinates I propose in the earlier section overturns the notion of the human as the sole subject and human subjectivity, whether that be through Big Science or technological innovation, as the only source of action. By instituting a more diverse range of governing coordinates, the nonhuman is given the same actant status as the human, each with their own subjectivities or agencies of various kinds. In so doing, I seek to think beyond the anthropocentrism of modern humanism that underpins current governance initiatives to working with climate change as an entangled socio-biophysical system. In framing climate change governance as new types of agentic collectives, we induct nonhuman others into civic

life and political and economic relations with humans, and weave together new worlds that are dynamic, fluid and contingent (e.g. Urry 2003; e.g., Latour 1993). In doing so we gesture toward new forms of post-humanism in climate change governance that encompasses an entire collective of beings and entities that are entwined with each other, each with their own forms of agency animated variously as matter, biochemicals, geological processes, technology, the discursive, thoughts, desires and so forth. By folding the human and nonhuman (discourse, thoughts, intentionality and material processes of various forms and kinds) as dynamic, nonlinear and complex systems and by redistributing agency across a range of entities (e.g., Bennett 2010; Deleuze and Guattari 1987) new types of narratives and courses of action for climate change emerge that must be attentive to these entanglements, their asymmetrical arrangements and nonlinear ramifications. Here, the demon carbon becomes just one of the many coordinates of climate change that is entangled in many different socio-natural relations. Conceptualizing governing practices according to more-than-human social collectives adjudicates time honored interventions that center around human will and intentionality as the sole means of acting on climate change instituted through human social, disciplinary, discursive and economic structures. Governing practices therefore must take account of dispersed actants and the entanglements of the human and nonhuman as well as earthly processes as dynamical, immanent and irruptive.

In framing climate change (Descola 2013, 11) and its governance as more-than-human social collectives we can then work with alternative concepts of social inclusiveness that acknowledge the many nonhuman things that now form part of civic life. In doing so we can acknowledge and work with the inter- and complementary relations between things by attributing the qualities of subjects and personhood (e.g. Descola 2013; Harvey 2007) to many social species. By engendering respect for various forms of life and inanimate things as a new position from which transactions can be made, we can promote an ethics of care based on composing respectful enmeshments between the human and nonhumans, and therefore better decisions about how best to deal with the ecological crisis.

Experimenting with ways to compose new relations between things in both small and more ambitious ways opens up the possibility of thinking and acting in the world differently, and accordingly frame exhibition content and new practices. In doing so we can move beyond the portrayal of science modeling of the climate system, with its focus on the behavior of the atmosphere as a bio-physical system and institute ways to model nonlinear systems made up of a diverse range of coordinates. To do this I draw on Michel Callon's use of *agencement*. *Agencement* is a concept drawn from Deleuze (Deleuze and Guattari 1987), and refers to arranging or to fitting together, for examplean assemblage, arrangement, configuration or layout. The utility of Callon's (2005) notion of agencement is the ability to first conceptualize new social collectives and governing practices as assemblages

composed of human actants, technological actants and natural actants, cosmological actants, theoretical and policy actants both modern and amodern and, second, to conceptualize governing practices as performed through the interactions between heterogeneous actors whose agency arises from, and is distributed across, the socio-technical arrangements that bring them together (Bennett and Joyce 2010: 13). But most importantly, for the purposes of rethinking climate change governance modeling practices, "forms of agency are considered variable and to some extent plastic and adjustable" (Callon 2005, 10). The gathering of things can theoretically be changed and reworked by reconfiguring the socio-technical agencements that brought them together and by inventing new forms of arrangement. One hubris game in *Atmosphere* gestures toward the notion of agencement, the plasticity of assemblages and the ability to compose a series of different socio-technical arrangements by changing things around. In this interactive exhibit a series of components as groupings of human and nonhuman actants are gathered and linked together. They include the Atmosphere, Land, Oceans, Ice and People. Players are invited to "change one and change them all." In doing so, the exhibit seeks to make visible each as having their own agentic forces entangled with others as a series of nonlinear and variable effects as a complex, variable and adjustable system.

Equally and by considering governing climate change as socio-technical arrangements it is possible to some degree to locate sources of action, establish origins, assign responsibility associated with a specific action and the relative asymmetrical agencies between different actants as a type of strategic intervention (Callon 2005, 4). Governing climate change is therefore not only made up of a diverse range of actants but also assemblages with their own gatherings of actants. Reconfiguring an agentic relation means "reconfiguring the socio-technical *agencements* constituting it, which requires material, textual and other investments" (Callon and Caliskan 2005, 24–25). Callon and Caliskan (2005) warn us that this process will also be partial. Latour (2011, 124) alludes to the utility of agencement as an ethnographical approach for composing alternative strategies and worlds, however, cautions us that in undertaking such a task we must ask ourselves "what world is it that you are assembling, with which people do you align yourselves, with what entities are you proposing to live?"

[AuQ9]

CONCLUDING COMMENTS

In returning to my opening paragraph I ask, "Can modernity really be on Nature's side as the Natural History Museum's message suggests?" I think not. To be truly on Nature's side is to induct the nonhuman fully into civic life, into more-than-human social collections or into what Latour calls his Parliament of Things (congregations of humans and nonhumans things)

where the nonhuman is seen as having agency, forces and capacities. Things such as the atmosphere, oceans and ice therefore must be brought into the museum as stakeholders and actants entangled with human designs and governing strategies (see Cameron 2012; Lash 1999).

Multi-naturalism can be foregrounded here as a way of disrupting the notion of climate change governance as one modern project set against the backdrop of one nature (Descola 2013, 173), as expressed in *Atmosphere*. By deploying multi-naturalism, governing can be rethought of as being composed of a diversity of natures and a diversity of entities as different ontological compositions of the world that include the human and nonhuman animated in various ways. This optic has the potential to break the one-world vision of climate change governance as science, technology and bio-political compliance. In reframing climate change governance beyond the one-world ontology of modernity, alternative programs can emerge and be, most importantly, acknowledged as valid and useful solutions.

REFERENCES

Adger, Neil. 2001. "Scales of Governance and Environmental Justice for Adaptation and Mitigation of Climate Change." *Journal of International Development* 13(7): 921–931.

Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bennett, Tony and Patrick Joyce. eds. 2010. *Material Powers: Cultural Studies, History and the Material Turn*. London: Routledge.

Bingham, Nick and Steve Hinchliffe. 2008. "Reconstituting Natures: Articulating Other Modes of Living Together." *Geoforum* 39(1): 83–87.

Boykoff, Max, Dave Frame and Samuel Randalls. 2010. "Discursive Stability Meets Climate Instability: A Critical Exploration of the Concept of 'Climate Stabilization' in Contemporary Climate Policy." *Global Environmental Change* 20: 53–64.

Braun, Bruce. 2006. "Environmental Issues: Global Natures in the Space of Assemblage." *Progress in Human Geography* 30(5): 644–654.

Callon, Michel 2005. "Why Virtualism Paves the Way to Political Impotence." *Economic Sociology—The European Electronic Newsletter* 6(2): http://econsoc.mpifg.de/archive/esfeb05.pdf

Cameron, Fiona R. 2012. "Climate Change, Agencies and the Museum for a Complex World." *Museum Management and Curatorship* 27(4): 317–339.

Castree, Neil. 2003. "Environmental Issues: Relational Ontologies and Hybrid Politics." *Progress in Human Geography* 27(2): 203–211.

Clark, Nigel. 2011. *Inhuman Nature: Sociable Life on a Dynamic Planet*. London: Sage.

Colebrook, Clare. 2012. "Not Symbiosis, Not Now: Why Anthropogenic Change is Not Really Human." *Oxford Literary Review* 34(2): 185–209.

Crutzen, Paul. 2002. "Geology of Mankind." *Nature* 415(23) doi:10.1038/415023a

deLanda, Manuel. 2006. *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London: Continuum.

Deleuze, Giles and Felix Guattari. 1987. *A Thousand Plateaus*. Minneapolis: University of Minnesota Press.

Descartes, Rene. 1641/2009. *Meditations on First Philosophy in which the Existence of God and the Immortality of the Soul are Demonstrated*. New York: Classic Books.

Descola, Philipe. 2013. *Beyond Nature and Culture*. Chicago: University of Chicago.

Gibson-Graham, Julie, Katherine. 2008. "Diverse Economies: Performative Practices for 'Other Worlds." *Progress in Human Geography* 32: 613–632.

Hall, Matthew. 2011. "Beyond the Human: Extending Ecological Anarchism." *Environmental Politics* 20(3): 374–390.

Harvey, Graham. 2007. *Animism: Respecting the Living World*. New York: Columbia University Press.

Head, Lesley. 2012. "Earthly Indifference and Human Difference." *Progress in Human Geography* 36: 683–685.

Head, Lesley and Mark Gibson. 2012. "Becoming Differently Modern: Geographic Contributions to a Generative Climate Politics." *Progress in Human Geography* 36: 699–714.

Hodder, Ian. 2012. *Entangled: An Archaeology of the Relationships between Humans and Things*. Malden, MA: Wiley-Blackwell.

Hulme, Mike. 2009. *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity*. Cambridge: Cambridge University Press.

Ingold, Tim. 2011. *Being Alive: Essays on Movement, Knowledge and Description*. London: Routledge.

Ingold, Tim. 2012a. "Looking for Lines in Nature." *Earthlines* 3: 48–51.

Ingold, Tim. 2012b. "Toward an Ecology of Materials." *Annual Review of Anthropology* 41(2012): 427–442.

IPCC Climate Change 2007: "Working Group I: The Physical Science Basis. 8.6 Climate Sensitivity and Feedbacks." www.ipcc.ch/publications_and_data/ar4/wg1/en/ch8s8-6.html

Lash, Scott. 1999. "Objects that Judge: Latour's Parliament of Things." http://eipcp.net/transversal/0107/lash/en

Latour, Bruno. 1993. *We Have Never Been Modern* (trans. Catherine Porter). Hertfordshire: Harvester Wheatsheaf.

Latour, Bruno. 1998. "To Modernise or Ecologize? That's the Question." In *Remaking Reality: Nature at the Millennium*, edited by Neil Castree and Bruce Willems-Braun, 221–242. London: Routledge.

Latour, Bruno. 2010. "An Attempt at a Compositionist Manifesto." *New Literary History* 41: 471–490.

Latour, Bruno. 2013. *An Inquiry Into Modes of Existence*. Cambridge, MA: Harvard University Press.

Law, John. 2012. "What's Wrong with a One-world World?" *Heterogeneities*. www.heterogeneities.net/publications/Law2011WhatsWrongWithAOneWorldWorld.pdf

Morton, Tim. 2008. *Ecology without Nature*. Cambridge, MA: Harvard University Press.

Morton, Tim. 2012. *The Ecological Thought*. Cambridge, MA: Harvard University Press.

Morton, Tim. 2013. *Hyperobjects: Philosophy and Ecology after the End of the World (Posthumanities)*. Minneapolis: University of Minnesota Press.

Nimmo, Richie. 2010. *Milk, Modernity and the Making of Modernity: Purifying the Social*. New York: Routledge.

Prigogine, Ilya and Isabelle Stengers. 1985. *Order out of Chaos: Man's New Dialogue with Nature*. London: Fontana

Swyngedouw, Eric. 2010. "Trouble with Nature—Ecology as the New Opium for the People." In *Conceptual Challenges for Planning Theory,* edited by Jean Hillier and Patsy Healey, 299–320. Farnham, Surrey: Ashgate.
Thrift, Nigel. 2008. *Non-Representational Theory.* London: Routledge.
Urry, John. 2003. *Global Complexity.* Cambridge, MA: Polity Press.
Woolgar, Steve and Javier Lezaun. 2013. "The Wrong Bin Bag: A Turn to Ontology." *Social Studies of Science June* 43: 321–340.
Young, Oran and Will Steffen, W. 2009. "The Earth System: Sustaining Planetary Life Support Systems." In *Principles of Ecosystem Stewardship: Resilience-Based Resource Natural Resource Management in a Changing World,* edited by F. Stuart Chapin III, Gary Kofinas and Carl Folke, 295–315. New York: Springer-Verlag.
Žižek, Slavoj. 2008. "Nature and its Discontents." *SubStance* 117, 37(3): 37–72.

5 Pushing Boundaries

Curating the Anthropocene at the Deutsches Museum, Munich

Luke Keogh and Nina Möllers

WELCOME TO THE ANTHROPOCENE

The Anthropocene has emerged as a popular term used by scientists and the media to partition the current phase of Earth's history. The concept suggests that the scale of human impact on the planet has become so great that the collective action of the species will be found in the geological record. Currently there is an Anthropocene working group of the Subcommission on Quaternary Stratigraphy who are preparing a proposal to the International Commission on Stratigraphy to have the period formalized. Institutions are becoming aware of the Anthropocene as a potential museum topic with recent efforts evident in either public programming, such as the Haus der Kulturen der Welt in Berlin, or in symposia and workshops, such as those held at the Smithsonian and the American Museum of Natural History. However, the Deutsches Museum is conceptualizing the first large-scale special exhibition solely dedicated to the Anthropocene, covering 1,450 square meters (ca. 15,600 square feet). The exhibition is a joint project with the Rachel Carson Center for Environment and Society. The Carson Center is an international research center supported by the German Ministry for Education and Research that is dedicated to furthering research and discussion in the field of environmental studies with the aim to strengthen the role of the humanities in the current political and scientific debates about the environment.

This chapter offers a contextual look at the conception of the exhibition thus far. First, we reflect on the concept of the Anthropocene. Second, we discuss the museum context, in particular the history of exhibitions at the Deutsches Museum that have focused on environmental issues, from the first permanent exhibition on environment in 1992 to a special exhibition on climate in 2002. While most special exhibitions challenge museum structures to some extent, it is the degree of interdisciplinarity makes the Anthropocene even more challenging as an exhibition. We conclude the chapter by discussing the conceptual and transdisciplinary challenges of creating an exhibition on the Anthropocene.

The term Anthropocene has only been in use for just over a decade. It has, however, antecedents reaching back to the late nineteenth and early

twentieth centuries, such as Antonio Stoppani's "Anthropozoic" (Stoppani 1873/2013) and Vladimir I. Vernadsky's "Noösphere" (Vernadsky 1945). In 2000, Nobel Prize–winning chemist Paul J. Crutzen described the term as a descriptor of the current phase of human habitation on Earth, and later in the same year gave a further impulse to the concept with a short publication (Crutzen and Stoermer 2000, 17–18). Soon the term was used in the global change community (Robin and Steffen 2007, 1696–1699). Through scientific studies, ranging from the carbon cycle to sediment flow, the Anthropocene emerges as the first epoch when humans have a leading role in changing the Earth system. It suggests that anthropogenic influence upon the Earth has been significant and will also have long lasting consequences (Zalasiewicz et al. 2011, 835–841). Although precise dates have not been confirmed, general discussion has focused on the Anthropocene as covering the period from the start of the industrial revolution in the late eighteenth century to the present, which includes "the great acceleration," a phase of increasing human consumption from 1945 to the present (Steffen et al. 2011). AuQ10

Climate change, more than any other issue before it, has brought into sharp focus the ability of the human species to influence planetary systems as a whole, but this is just one of many problems that have an impact on a planetary scale. "[C]limate change is only the tip of the iceberg," note Will Steffen and others in their review article of the Anthropocene concept (Steffen et al. 2011, 843). As they point out, as well as the carbon cycle, humans are significantly altering the nitrogen, phosphorous and sulfur cycles; are significant global actors in sediment movement; are altering water vapor flow from land to atmosphere primarily through land-cover change; and are potentially driving the sixth major extinction event in Earth's history (Steffen et al. 2011, 843). A component of the Anthropocene thesis is the "great acceleration." It suggests that since around 1950 human consumption and usage of things ranging from paper to water, from McDonald's restaurants to international tourism, has risen exponentially (Steffen et al. 2011, 849–853). And it is this late phase, roughly coinciding with the signature of nuclear fallout in the soil, which shows the dramatic and accelerating impact of humans on the planet. Some stratigraphers and geologists argue that the evidence is not there for Anthropocene to be officially recognized as an epoch (Whitney and Holbrook 2012, 60–61). Many of the same objectors, however, do not discredit the usefulness of the term for creating broader public awareness.

LOOK DOWN: TURNING TO THE GEOLOGICTURN

Although it only has a short history, the Anthropocene was received into humanities disciplines within a decade of its articulation in the global change scientific community. Some humanities scholars have suggested that an overarching concept such as Anthropocene, in a purely scientific sense, can lack specificity of cultural diversity and awareness of regimes of power that have

brought us to this point (Clark 2011; Wilke 2013). If the concept suggests the reach of human action into all corners of the globe, then it is also important to remember the significance of cultural diversity in providing a "creative friction" in a globalized world (Tsing 2005, x). Furthermore, understanding the unequal consumption and distribution of resources and wealth and the impact this has on different cultures is a continuing task in the Anthropocene (Davis 2002; Gordillo 2011). However, the Anthropocene concept appears original in its genuine challenge of nature-culture dichotomies. Now that we realize that humans have fundamentally altered nature and have brought about many of the phenomena like climate change, it is no longer possible to simply level blame at the forces of nature. As Will Steffen, Paul Crutzen and John McNeill noted: "Humanity is, in one way or another, becoming a self-conscious, active agent in the operation of its own life support system" (Steffen, Crutzen, and McNeill 2007, 619). This new period also undermines our understanding of humanity. Thus historian and postcolonial theorist Dipesh Chakrabarty noted: "To call human beings geological agents is to scale up our imagination of the human" (Chakrabarty 2009, 206).

Taking stock of these insights from both the sciences and the humanities, the members of the Anthropocene exhibition team, in particular geologist Reinhold Leinfelder, described that, in the Anthropocene, we need to see an "usworld" (translated from the German *Unswelt*) (Leinfelder 2012; Leinfelder et al. 2012, 12–17; Leinfelder 2013). It is this notion of an "us" that makes it so difficult to draw up easy divides between nature and culture. An *usworld* challenges how we know ourselves. As a species we have become a geological force; as individuals we are actors on this stage. The Anthropocene is not just about environmental decline, it also covers a period that saddles some of the great inventions and thinking on human freedom. Imagining the Anthropocene, according to an usworld approach, argues that we blend nature, culture, technology and society into one perspective.

In the humanities fields of literary, gender and postcolonial studies, the Anthropocene is quickly becoming a platform of critique. One important aspect is identifying underlying modes of cultural hegemony. As literary scholar Sabine Wilke writes, the humanities "concern themselves with the study of intellectual creation and the critique of dominant narratives, myths, and ideologies, and the critical engagement with fundamental questions of meaning, value, responsibility, and purpose in a period of escalating crisis" (Wilke 2013, 67–74). For Wilke, a critical Anthropocene approach must engage with frameworks and insights from post-colonial theory and environmental justice and continuously question the developing Anthropocene narrative for ideological underpinnings. Other humanities scholars have offered different perspectives beyond these "post" conditions, some argue that there is no future of life in the Anthropocene, rather only "prospects" (Dibley 2012). Others have rephrased the concept to "Techanthropocene" (Ziarek 2011); and others have seen it as the end of the "great stone book of nature" (Szerszynski 2012). More broadly, many discussions focus on the way the

Anthropocene reconfigures how we think collectively about humanity. In this way, as Paul Alberts (2011) argues, it offers opportunities to reframe our normative traditions and challenge our collective human responsibility.

Some approaches in the humanities have also found the geological provocation of the Anthropocene as a useful concept when approaching the material conditions of human life. In their book *Making the Geologic Now* (2013), Elizabeth Ellsworth and Jamie Kruse collect a group of artists and scholars around the notion that the geologic has become a condition of contemporary life. The Anthropocene, quite literally the strata of humans, is an important thread throughout the book. Their approach is not so much critique but to generate discussion around what they term a "geological turn." In doing this, they attempt to "direct sensory, linguistic, and imaginative attention toward the material vitality of the Earth itself" (Ellsworth and Kruse 2013a, 25). They cite examples from the earthquake off the coast of Japan in 2011 (among other earthquakes, such as the one in Haiti), the discovery of the Great Pacific garbage patch, and the Gulf of Mexico oil spill; to the death of coral reefs caused by climate change, the Three Gorges Dam in China and carbon sequestration. Their primary focus, inspired by the work of Jane Bennett, is materiality—shifting us away from pictorial images and views of landscape toward, quite simply, the Earth's surface. "Making a geologic turn, we create an opportunity to recalibrate infrastructures, communities, and imaginations to a new scale—the scale of deep time, force, and materiality." Ellsworth and Kruse continue: "we are not simply 'surrounded' by the geologic. We do not simply observe it as a landscape or panorama. We inhabit the geologic" (Ellsworth and Kruse 2013a, 25; Szerszynski 2012). If we inhabit the geologic, then an exhibition might place people in their own strata. AuQ11

Calls toward the Anthropocene have also warranted popular media coverage and inspired some museums and artists to work with the term (Kolbert 2011; Kramer 2013; Walter 2013; Welcome to the Anthropocene 2011). In Germany, the Anthropocene has found cursory entrance into the museum landscape in several exhibitions, among them in 2013: *Coal Global* at the Ruhr Museum, Essen, and *Planet 3.0* at the Senckenberg Natural History Museum in Frankfurt. While there is evidence of museums' awareness of the term, the Deutsches Museum special exhibition on the Anthropocene is an ambitious attempt by a large museum primarily focused on science and technology to exhibit the concept in its scientific and humanistic complexity.

EXHIBITING THE ENVIRONMENT, 1992 AND 2002

On first glance, the Deutsches Museum in Munich may seem a surprising venue for an Anthropocene exhibition. A brief look at its history, particularly its engagement with environmental issues, is important to understand the challenges and opportunities for the Anthropocene exhibition.

From the outset the museum was founded on engineering. At the turn of the twentieth century, German engineers began to search for social acknowledgment. In order to reinforce their claim to steering and planning competence for society, they looked for spaces where technological achievements and inventions would be presented in such a fashion as to lift them to the level of cultural and artistic masterworks. They found their congenial partner in Oskar von Miller, founder of the Deutsches Museum. His idea of a museum of masterworks of natural sciences and technology that communicated the importance of engineering achievements to "laymen" soon gathered many influential supporters such as the engineer Rudolph Diesel (Füssl 2010, xv). After having spent a few years in the Old National Museum showcasing provisional collections, the Deutsches Museum finally got its own space on Museum Island, where the new museum building was opened in 1925. True to its conceptual idea, the museum focused on so-called masterpieces that were presented as part of histories of linear development. These lines of objects often started with older, more simple versions and ended with—often supported by gifts from the industry—the newest and supposedly most advanced technology. By presenting these linear, successive lines of objects, the museum's exhibitions tied into the belief in progress and technology typical for engineers of that time. Uncertainty, side effects or even failure were not part of the picture. With regards to the fields of expertise, the Deutsches Museum adhered to a clear-cut assembly of traditional sciences and applied technologies reaching from physics, geology, astronomy and chemistry over to energy and mining technology to transportation and household appliances. Environment as a cross-cutting issue was not yet considered and even nature was only seen as a force to be reckoned with, which humans would be able to tame and use for their own good by means of technological know-how.

Today, the scope of the museum has broadened to include a range of topics including those that engage with environmental issues. The first permanent exhibition on the environment in the Deutsches Museum was opened in 1992. It reflects both fundamental shifts in museological thinking that had started in the 1970s and found their material expressions in galleries in the late 1980s and early 1990s as well as the particular context of the Deutsches Museum as an institution of sciences and technology. The first handbook on environmental topics in museums had been published by the American Association of Museums (AAM) in 1971. German museological discussions in respect to the transformation of museums as "temple of the muses" into learning centers shifted museum professionals' attention toward environmental topics and in particular environmental problems (Museums and the Environment 1971; Spickernagel and Walbe 1976). It is against this museological discussion that the early permanent exhibition at the Deutsches Museum needs to be viewed as it focused primarily on topics such as population growth, fossil fuel use, the ozone layer, recycling, and water and air pollution. The gallery mostly relied on models, texts and images and presented the topic largely in the framework of a history of decline. In one of the few object installations there were a number of tools used for environmental

Figure 5.1 Original exhibition gallery on refrigeration at Deutsches Museum showing a range of cooling technologies from natural ice production to electric refrigerators for private households, ca. 1930. Credit: Deutsches Museum (DMA BN05992).

analysis, such as an ozone measuring cell and a soil suction probe. Each of the themes outlined were presented through images, text and media installations which focused on causation as a premise: that through harnessing technology humans have caused problems and with technology they may be able to solve these issues. Although this initial gallery was reworked in 1998 and moved to a different place within the museum (it currently sits beneath the large hall of energy technologies, which includes steam engines), the basic concept remains the same and has served as the basis for the museum's discussion of environmental issues until now. Even though this gallery has helped in bringing to the forefront environmental problems arising from technology usage, it has not yet resulted in a more integrative view of nature and culture. As a concluding remark on the environment exhibition, it must also be noted that the Deutsches Museum is currently undergoing a far-reaching restoration and modernization plan called "Future Initiative." Until 2025, the museum's buildings and infrastructure will be modernized as well as all its galleries. The updating and new conception of all permanent exhibitions also includes new structures for the galleries. Environment as a topic will be included in the theme cluster on Earth system, agriculture and food, energy, urbanization and consumption.

Triggered by scientific findings and public debates on climate change resulting particularly from the IPCC reports, the Deutsches Museum presented its first major special exhibition on climate change in 2002 with *Climate: The Experiment with the Planet Earth*. True to its founding concept, the museum focused primarily on the scientific background of the climate change debate. Subthemes that were covered included among others, worldwide networks of measuring and gathering data, meteorology, early technological ideas of influencing the climate and natural catastrophes resulting from climate change. The exhibition also included a historical perspective focusing on human reactions to, and the handling of, climate variability in the past and present. The underlying idea that nature and technology could no longer be viewed separately, but needed to be seen in their interdependencies, was one of the major findings that was very poignantly expressed in the catalog: "Weather and climate, one might think, are no topics for a museum of technology, but concern nature. . . . Nature and culture, however, may no longer be neatly separated from each other which is why the prominent symbol of technological culture, the steam engine, is chosen as the opening of this climate exhibition in the museum of technology" (Hauser 2002, 9; translated from the German by Nina Möllers). Focusing on climate as a global and interdisciplinary topic was the museum's first step toward a more integrative view on environment, now leading—as the next instalment in this development, so to speak—to the Anthropocene exhibition in 2014.

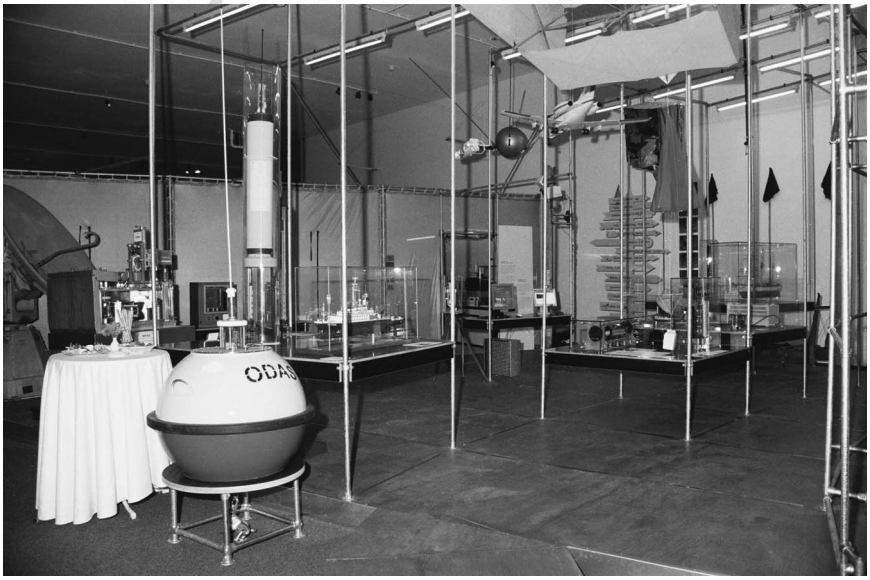


Figure 5.2 Special exhibition *Climate: The Experiment with the Planet Earth*, Deutsches Museum, 2002. Credit: Deutsches Museum (DMA L_5765_25a).

Anthropocene: The Exhibition

The Anthropocene—both its phenomena and its philosophical concept—presents fresh challenges to the Deutsches Museum. In this "age of humans" we must think, reflect and debate. As curators we cannot just exhibit, we must create platforms of discussion. In this section we give a brief discussion of the conception and goals of the Anthropocene exhibition.

The exhibition's main goal is to inform visitors about the Anthropocene as a currently debated vision of the role of humans on Earth. It will show the effects of human intervention as a biological and geological actor and the extent of these changes. By translating the concept into a three-dimensional space, the exhibition offers the general audience a unique opportunity to experience the Anthropocene and learn about the current state of scientific knowledge and the discussions surrounding the geological and cultural concept of the Anthropocene. It will not, however, be conceptualized as a history of decline, but as a complex and often ambivalent story of destruction and shaping. As outlined above, the Anthropocene also attempts to overcome the dualism between nature and culture, and this thread will be woven throughout the exhibition, such as an installation working with invasive species and in a section dedicated to disrupting preconceived ideas of nature.

With the exhibition in mind a small internal survey (taking in over 100 patrons) was conducted over a two-month period in late 2012 (Bäuerlein and Förg 2012). Eighty percent of those interviewed wanted the museum to engage with controversial topics. While, as we have shown, the Deutsches Museum has previously engaged with environmental topics, the Anthropocene is a further challenge because it has limited understanding in the broader public. It was found that 86% of the interviewees had no knowledge of the concept. Patrons identified a number of issues as the biggest environmental problems such as pollution (49%), climate change (21%), supply problems (16%), nuclear risk and issues (9%) and deforestation (5%). It was also found that over 80% of patrons thought that the impacts of industry were bad for the environment. Another illuminating result regarding technology was that half of the patrons believed it to have a negative impact on environment and almost half believed that technology could not solve environmental problems. In light of the survey, the Anthropocene as a holistic and reflective concept is an important one to present to the public because it can engage with a wide range of environmental problems and, in turn, ask people to engage with how they perceive solutions. However, just communicating the idea—*what it is*—will be a very important part of introducing and branding the exhibition.

The exhibition is structured into three parts. The first section provides a comprehensive introduction into the Anthropocene both as a geological hypothesis and new conceptual framework. The introduction visualizes the importance of industrialization and the notion of the great acceleration. The second part of the exhibition consists of six thematic areas that present

selected Anthropocene phenomena, looking particularly at systemic connections, global and local interdependencies, and its temporal dimensions. The themes covered are urbanization, mobility, nutrition, evolution, human-machine interaction, and nature. The latter, nature, may seem out of place given the challenges of nature-culture duality in the Anthropocene, but it is a significant area that confronts and challenges all of us, curators and patrons alike, about how nature has been perceived historically and how this is different in the Anthropocene—the work of the Amsterdam-based group Next Nature is particularly inspiring here (van Mensvoort and Grievink 2011). The connecting logic throughout these themes is a "geological layer"—a large-scale graphics envisioning future geologic markers of the Anthropocene—that will bring a materiality that embeds visitors in the strata of their creation. The final section discusses the future in the Anthropocene. It looks at past visions of the future, emphasizing their transformative potential while simultaneously highlighting their fragility and ambivalence. The final section is a much more relaxing space with a final installation inviting people not only to listen to possible scenarios but also to plant their possible scenario in a field of paper flowers that will evolve with different colors throughout the exhibition. It calls on each individual to reflect on their role and desires for the future in the Anthropocene.

Choosing the Anthropocene as a topic for a museum exhibition comes with many challenges, but also opportunities. First and foremost, as an epoch it encompasses the entire globe throughout Earth's history. Independent of where the beginning of the Anthropocene may finally be set, as a

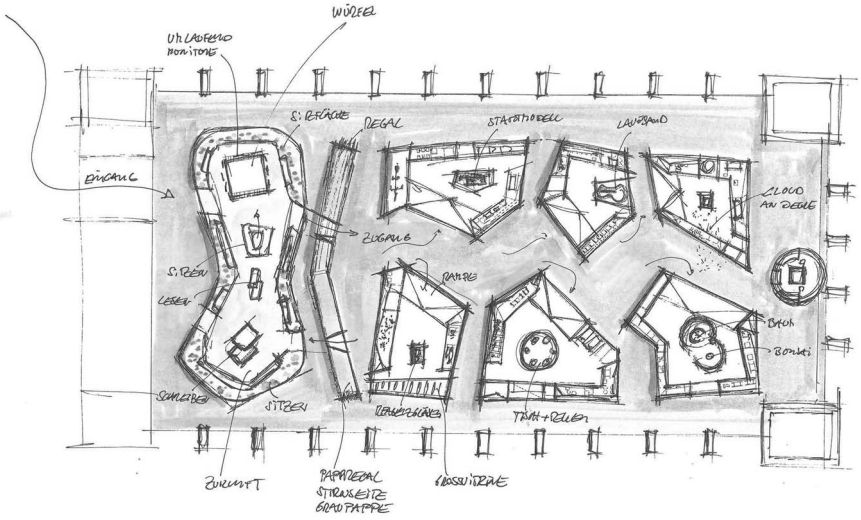


Figure 5.3 Sketch of the special exhibition *Welcome to the Anthropocene. The Earth in Our Hands*, Deutsches Museum. Credit: Klaus Hollenbeck Architekten.

new epoch and as a philosophical framework it refers to a sheer unlimited number of phenomena, all interconnected. Another challenge can be seen in the fact that we are defining, researching, shaping and representing this Anthropocene epoch while it is happening. This openness of the Anthropocene as a concept yet to be grounded or accepted in scientific and cultural circles confronts the museum, the curators, and exhibition-makers, as well as the visitor, with new challenges. While exhibitions are always selective representations of specific interpretations of our world, the uncertainty that surrounds the Anthropocene challenges the traditional perception of museums as agencies and mediators of knowledge where people can learn how things "really are". The museum cannot (and maybe no longer should) offer this assurance of certainty. Museums of science and technology, like the Deutsches Museum, can no longer pretend to authenticate knowledge, nor can the public continue to expect this. What the exhibition instead aims to do, is to create space—literally and figuratively—for free thinking, discussion and the visualization of the Anthropocene. The museum offers the greatest interface to convert abstract and academic Anthropocenic thinking to the public.

The great task is to find suitable ways for approaching visitors and making the Anthropocene relevant to them. As with any other exhibition, this is easier said than done. In the process of conceptualizing the Anthropocene exhibition, it is surprisingly clear that it is quite difficult to build the Anthropocene around museum objects. Although the collections of the Deutsches Museum could easily be seen as a materialization of the Anthropocene in their entirety, when it comes to pinpointing the stories and finding what we call the "Anthropocene moment," it quickly becomes messy. It may be, however, that we need to learn to live with this messiness and concentrate on the networks, systems of interconnections. The Anthropocene exhibition may be a first step in realizing that our world is no longer in order. By translating the Anthropocene into a three-dimensional space, the exhibition can translate the Anthropocene's systemic character. While as curators we can conceptualize the exhibition into parts and designers can facilitate a pathway throughout the large exhibition space, ultimately an exhibition space affords visitors multi-perspective and nonlinear opportunities. They get the opportunity to make their own decisions, tour where they want to, form their own experiences, and come up with different interpretations—thus a landscape filled with paper flowers folded by individuals. The exhibition in Munich is part of an ongoing and participatory debate about the Anthropocene. It therefore will not provide final answers to all questions, but rather encourage reflection and discussion; hoping, possibly, to turn insights into action.

The Anthropocene poses a challenge not only to humankind and our planet, but also to the museum world. Necessitating a new perspective on the relationship between nature and culture, it also calls into question traditional and often cherished museum categories that for too long have

compartmentalized our knowledge into disciplines, cultures and periods of time. Not despite, but because they are collecting institutions, museums are in the position to connect the deep past through the Anthropocene present to the deep future while building their future at the same time.

REFERENCES

Alberts, Paul. 2011. "Responsibility Towards Life in the Early Anthropocene." *Angelaki* 16(4): 5–17.

American Association of Museums (Environmental Committee). 1971. *Museums and the Environment: A Handbook for Education*. New York: Arkville Press.

Autin, Whitney J. and John M. Holbrook. 2012. "Is the Anthropocene an Issue of Stratigraphy or Pop Culture?" *GSA Today* 22(7): 60–61.

Bäuerlein, Henrike and Sarah Förg. 2012. "Vorab-Evaluation zur Sonderausstellung, Anthropozän—Natur und Technik im Menschenzeitalter," August–September, Unpublished Report, Munich, Deutsches Museum.

Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35: 197–222.

Clark, Nigel. 2011. *Inhuman Nature: Sociable Life on a Dynamic Planet*. London: Sage.

Crutzen, Paul J. and Eugene F. Stoermer. 2000. "The 'Anthropocene'." *Global Change Newsletter* 41: 17–18.

Davis, Wade. 2002. "The Naked Geography of Hope: Death and Life in the Ethnosphere." *Whole Earth* (Spring): 57–61.

Dibley, Ben. 2012. "'The Shape of Things to Come': Seven Theses on the Anthropocene and Attachment." *Australian Humanities Review* 52. www.australianhumanitiesreview.org/archive/Issue-May-2012/dibley.html

Ellsworth, Elizabeth, and Jamie Kruse. 2013a. "Evidence: Making a Geological Turn in Cultural Awareness." In *Making the Geological Now: Responses to the Material Conditions of Contemporary Life,* edited by Elizabeth Ellsworth and Jamie Kruse, 6–26. Brooklyn: Punctum.

Ellsworth, Elizabeth, and Jamie Kruse, eds. 2013b. *Making the Geological Now: Responses to the Material Conditions of Contemporary Life*. Brooklyn: Punctum.

Füssl, Wilhelm. 2010. "The Deutsches Museum and Its History." In *Technology in a Changing World: The Collections of the Deutsches Museum,* edited by Wolfgang M. Heckl (trans. Hugh Casement and Jim O'Meara), xiv–xvi. München: Deutsches Museum.

Gordillo, Gaston. 2011. "Ships Stranded in the Forest." *Current Anthropology* 52: 141–167.

Hauser, Hauser, ed. 2002. *Klima—Das Experiment mit dem Planeten Erde*. München: Deutsches Museum.

Kolbert, Elizabeth. 2011. "Enter the Anthropocene—Age of Man." *National Geographic,* March: 60–77.

Kramer, Kristina. 2013. "Poetics of Landscape in the Age of Mankind—Koray Kantarcioglu's Bitmap Landscapes." In *Landscapes,* edited byKoray Kantarcioglu, 8–11. Istanbul: Nesrinesirtgen Collection.

Leinfelder, Reinhold. 2012. "Von der Umweltforschung zur Unsweltforschung." *Frankfurter Allgemeine Zeitung,* October 12.

Leinfelder, Reinhold. 2013. "Assuming Responsibility for the Anthropocene: Challenges and Opportunities in Education." *Rachel Carson Center Perspectives* 3: 9–28.

Leinfelder, Reinhold, Christian Schwägerl, Nina Möllers, and Helmuth Trischler. 2012. "Die menschengemachte Erde: Das Anthropozän sprengt die Grenzen von Natur, Kultur und Technik." *Kultur und Technik* 2: 12–17.

Mensvoort, Kurt van, Henkrik-Jan Grievink, eds. 2011. *Next Nature: Nature Changes Along With Us*. Barcelona: Actar.

Robin, Libby, and Will Steffen. 2007. "History for the Anthropocene." *History Compass* 5(5): 1696–1699.

Spickernagel, Ellen, and Brigitte Walbe, eds. 1976. *Das Museum. Lernort contra Musentempel*. Gießen: Anabas-Verlag.

Steffen, Will, Paul J. Crutzen, and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36(8): 614–621.

Stoppani, Antonio. 1873/2013. "First Period of the Anthropozoic Era." In *Making the Geological Now: Responses to the Material Conditions of Contemporary Life,* edited by Elizabeth Ellsworth and Jamie Kruse (trans. Valeria Federeighi), 36–41. Brooklyn: Punctum.

Szerszynski, Bronislaw. 2012. "The End of the End of Nature: The Anthropocene and the Fate of the Human." *Oxford Literary Review* 34(2): 165–184.

Tsing, Anna Lowenhaupt 2005. *Friction: An Ethnography of Global Connection*. Princeton, NJ: Princeton University Press.

Vernadsky, W.I. 1945. "The Biosphere and the Noösphere." *American Scientist* 33(1): 1–12.

Walter, Stephen. 2013. *Anthropocene*. Londonnewcastle Project Space, July 3–28.

"Welcome to the Anthropocene." 2003. *The Economist*, May 26.

Wilke, Sabine. 2013. "Anthropocene Poetics: Ethics and Aesthetics in a New Geological." *Rachel Carson Center Perspectives* 3: 67–74.

Zalasiewicz, Jan, Mark Williams, Alan Haywood and Michael Ellis. 2011. "The Anthropocene: A New Epoch of Geological Time?" *Philosophical Transactions of the Royal Society A* 369: 835–841.

Ziarkek, Krzysztof. 2011. "The Limits of Life." *Angelaki* 16(4): 19–30.

6 Futuring Global Change in Science Museums and Centers

A Role for Anticipatory Practices and Imaginative Acts

Juan Francisco Salazar

> The future is already here, it is just not very evenly distributed.
>
> William Gibson (1999)

One defining quality of our current moment in the world is the disposition to thinking and living in anticipation of the future. Some would argue that we appear to be increasingly living in a "regime of anticipation" (Mackenzie 2013) in which likelihoods and probabilistic outcomes prevail. This intensification of modes of knowing the emerging worlds that *the future* brings about is marking a peculiar mode of anticipation, one that urges social actors—and the biophysical sciences above all—to get hold of the as-yet-not. For the purposes of this chapter, this appraisal of the "not yet" is traversed by a fundamental, game-changing question: that is, as Robin et al. ask, "how can we live in a world where there is no nature without people?" (Robin et al. 2013, xv). The underlying significance of this matter is that what we do next has fateful consequences for human and nonhuman life on earth. No longer do we have the option to step out of civilization with the recourse of coming back to it at a later time once the crisis is over.

Climate change has become a provoking issue for science museums and science centers. It has demanded from these institutions new modes of engaging publics beyond passive modes of informing visitors about the science of climate change. Across multiple scales, science centers and museums have been challenged to undertake a more assertive stance in informing publics and communicating to audiences the complexities of climate change and its impacts on everyday life (Robin 2011).

The short period from the release in 2007 of the Fourth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC) to the Copenhagen XV Conference of Parties in 2009 seem to coincide with not only a peak in media coverage and public concern with climate change, but also with great interest in climate change exhibitions in science museums and centers around the world. In fact, recent years have seen some considerable debate over the role and agency of museums and science centers in climate change communication at a point where, as some observers

are pointing out, public concern for environmental issues might actually be at its lowest in twenty years (Vaughan 2013).

Yusoff and Gabrys (2011) have suggested that this period sees "new cultures of climate change," which they define through three distinct temporal and spatial imaginative framings of climate change. First, according to the authors, we find a concentration on the futurity of climate change, evidenced by a range of practices and techniques such as scenario modeling and foresight narratives. In a second instance there is what they call a process of *re*-public-*ing* and relocate-*ing* climate change, where adaptive strategies are embedded in everyday practices. This for Yusoff and Gabrys implies a "recasting of climate change as something that is not 'out there' . . . but as something that has relevance for all cultures across all scales, and thus is something 'in here', entangled in contemporary practices and future possibilities." Then, the third framing is what they see as a 'cultural turn' in climate change that seeks to redefine the boundaries of climate beyond science and an expansion of modes of climate science production in order to "reconsider the social spaces of climate interaction at the science-policy-public interface, and to promote new forms of the coproduction knowledge between different communities of practice (such as science–art or art–public collaborations)" (Yusoff and Gabrys 2011, 517).

Using this framework I discuss how climate change science is a prevalent setting—among others—where anticipation takes hold. I start with a brief overview of some of the flaws in climate change communication and then move on to a critique of how, in science museums and centers, the science of climate change is often presented as a scientific epistemic object that is given authority and prevalence over other modes of storytelling. I then move into discussion of what the possibilities might be for the museum sector to use anticipatory future-making practices to open up spaces that may contribute to building communities capable of engaging and responding to global climate change. The chapter draws on qualitative research undertaken between 2009 and 2011 as part of an Australian Research Council Linkage Project Grant titled "Hot Science Global Citizens: The Agency of the Museum Sector in Climate Change Interventions." The research involved observations, interviews carried out at a range of science museums and centers, and experience of different programming initiatives.

COMMUNICATING CLIMATE CHANGE

As demonstrated by a plethora of recent critical communication and media research (Boyce and Lewis 2009; Boykoff 2011; Diaz-Nosty 2009; Hansen and Doyle 2011; Moser 2010; Salazar 2011; Schmidt et al. 2013; Yusoff and Gabrys 2011), the media plays a key role on amplifying the uncertainty of climate change. It does so primarily by framing and (re)presenting

climate change and environmental risk in ways that become contested cultural constructs embedded in deep ideological structures (Carvalho 2007). It also does so by focusing on disseminating recycled scientific information to passive audiences (consumers of information). There is also tendency in news reporting on climate change to focus mostly on the information of climate change events and less on the communication of climate change processes. This is crucial when we see that the media constitute the main source through which citizens and publics are informed about climate change issues and controversies and are *the* determining factor in shaping the degree of awareness and concern—or lack thereof—of the population. Going even further, it may be argued that the media play a huge role in civic "conscientization" around climate change—in the sense given by Paulo Freire (2006) to describe the process of developing a critical awareness of one's social reality through reflection and action.

The lesson to be learned here is the importance of distinguishing what we mean by information and what we mean by communication. The first is understood as a one-way transmission of messages, the latter understood as a two-way dialogic process of exchange. For example, a study conducted between 2005–2007 among twenty-one of the largest newspapers in Latin America from seven countries showed how news media frame certain preferred discourses of environmental risks over others. For instance, no newspaper had more than 1% of news on climate change. Only 58% of these were a direct reference across three news themes: dissemination of scientific of data, global governance and political events, and climate events and disasters. Like other studies, this report concluded that local news agencies are not generating news not even within their own countries. Thematic treatment is mostly international with almost no reference to the local level. This demonstrates how the discursive construction and reproduction of scientific claims in the media are strongly entangled in ideological standpoints that legitimate "a program of action vis-à-vis a given social and political order" (Carvalho 2007, 223) where ideology "works as a powerful selection device in deciding what is scientific news, i.e. what the relevant 'facts' are, and who are the authorized "agents of definition" of science matters" (Carvalho 2007, 223). The media are key elements in the mediation of the "relations of definition" (Beck 1992) between science, the public and political spheres. The media often give shelter to marginal positions that lie outside the scientific consensus in a proportion way bigger than their academic weight. The result leads to inflated denial leading to real processes of misinformation. For example, in a report titled "Whatever the weather" commissioned in 2008 by the Environment Programme of the UK-based nongovernmental organization Panos London, forty-seven journalists were surveyed in Honduras, Jamaica, Sri Lanka and Zambia. The report concluded that a lack of information about climate change, combined with too few well-informed and interested editors, prevented appropriate media coverage of climate change in these countries (Harbinson 2006).

Yet despite this array of work coming to the fore on the mediations and framings of climate change, and the ways in which publics are informed—and misinformed—through the media, far less attention has been paid to examining the role of museums and science centers in communicating the science of climate change. Lessons to be learned for museums and science centers involve developing a sharper focus on the mediations of climate change rather than the media itself. This is in part the reason why we turn our eye to the role that science museums and centers play in "futuring" and "auctioning" climate change. What are urgently needed are not so much awareness campaigns but deep civic-driven processes of social change. There are too many examples of massive climate change action campaigns through mass media and social media but these campaigns often prove difficult to sustain without continuous funding. They tend to target individual behavioral change, and rarely actually contribute to establishing dialogue with communities. This is particularly important when considering the existing "information gaps" between global and local levels (Huq 2008 in Nightingale 2008). Climate change research is largely global in focus and there seems to be a much more robust level of understanding of global-scale processes of change. This research aims at enhanced understanding, and is driven by experts (Shaw et al. 2009), however, there is a much weaker understanding of climate change at a local level, where the actors in climate change mitigation, adaptation and anticipation are actually located (see also Yusoff and Gabrys 2011).

Therefore, in order to address questions of "futuring" and "actioning" climate change in museums and science centers, I put forward two interrelated propositions that point to the potential of museum and science centers for facilitating co-creation of narratives and collective action around climate change. First, the museum sector has a role to act as change-agents in fostering a new form of "public pedagogy" (Giroux 2003) grounded on the integration of a range of "civic epistemologies" (Jasanoff 2005) around climate change education and action. By this I mean the ways in which institutions can foster the pedagogical conditions that might lead to new forms of self and social critique as part of a broader project of constructing alternative desires and critical modes of imagining socio-ecological futures. Second, as we have discussed elsewhere (Cameron et al. 2013), the museum sector must continue innovating across a multiplicity of modes of engagement with audiences, visitors, and publics to allow museum spaces to become sites where, through the agency of objects and immersive environments, a range of sensorial and affective experiences of climate change and futures can be performed.

Taken together, these propositions stress that museums have a role to play in forward-looking (anticipatory) learning, as a key element for understanding the wide range of knowledge practices in adaptation and resilience in the context of global change futures. What is at stake here, and where a crucial opportunity for science museums and centers lies, is how we overcome the

tension between "learning *about* the future" and "learning *with* multiple futures" (Wilkinson and Mangalagiu 2012).

IMAGINING GLOBAL CHANGE FUTURES

Despite all the political turbulence of the last decade, or the constraints put forward by a poorly conceived idea of neutrality and objectivity in journalism practice, and notwithstanding an apparent slowing down of global warming in the past fifteen years (IPCC 2013), scientific data continues to indicate that the big picture of human induced abrupt massive-scale climate change remains unchanged. The most recent projections of the IPCC continue to be of a planet that will warm up anywhere between 0.5 and 4.8°C by the end of the century and which could see a sea level rise of between 0.26 and 0.82m. In other words, the planet is now so deeply scarred by human activity that climate change cannot be fully understood without reference to social and political change. In that sense, we are just beginning to understand what emerging worlds at "nature's end" (Hastrup 2013; Sorlin and Warde 2009) may actually look like.

Climate change is an "inherently futures-oriented problem" and perhaps the most challenging assessment "of our capacity to exercise foresight" (McGrail 2013, 21). The science of climate change is presenting us with a series of possible, probable, and preferable futures that lie inside and outside of "planetary boundaries," defined as that "safe operating space for humanity" with respect to the Earth system and its associated biophysical subsystems or processes (Rockström et al. 2009, 472). The science of climate change relies on advancing certain epistemic objects over others. Nearly all the scenarios being put forward by scientific global change horizon scanning exercises are in fact summonses to recognize, as Kerstin Hastrup notes, that as we become agents of planetary geologic change it is no longer possible "to entertain the notion of a self-generating nature, beyond the human domain" (Hastrup 2013, 1).

This enduring conjuncture is evinced in the fact that the year 2013 ended without any major advances in the global climate change landscape. Another Conference of Parties (COP19 in Warsaw) came and went, only days after *Typhoon Haiyan* devastated the Philippines and during which Australia, Japan and Canada were heavily criticized for announcing their plans to weaken emissions targets. Notwithstanding the Doha amendment to the Kyoto Protocol achieved at the end of the 18th Conference of Parties (COP18) in Qatar in late 2012, a substantial global climate change agreement remains unattainable for 2015.

On the other hand, the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), released in October 2013, determined yet again—and perhaps more convincingly—that the most significant basis of climate uncertainty continues to be political rather than scientific. In the

words of Sheila Jasanoff, "the contentious global politics of climate change presents a special puzzle because it contradicts expectations that a strong scientific consensus will promote policy convergence" (Jasanoff 2011, 129). Despite trifling advancements toward alternative energy and environmental governance regimes, the actual barrier for any binding international consensus continues to be the reasoning that climate change can be solved and must be tackled within the logic of liberalization and expansion of free market principles (the logic of cap and trade) and our crude reliance on fossil fuel systems. However, while the 2009 Copenhagen Accord provided timid recognition of the scientific assessments that global temperature should not increase more than 2°C, it also evidenced the ongoing radical discrepancies within north-south dynamics that have been evident at COP meetings, where the political rift between big and small actors disallows any possibility for founding any radical political consensus-making institutional configuration of international climate change governance.

Conversely, differing pleas have timidly emerged in recent years calling for a "polycentric approach" to climate change (Ostrom 2009; Vasconcelos et al. 2013). These polycentric approaches rest on the analysis that global institutions are not capable of providing any substantial improvements concerning worldwide cooperation and what is needed instead is a "bottom-up institutional approach to cooperative governance of risky commons" (Vasconcelos et. al. 2013). For Ostrom,

> Single policies adopted only at a global scale are unlikely to generate sufficient trust among citizens and firms so that collective action can take place in a comprehensive and transparent manner that will effectively reduce global warming. (Ostrom 2009)

Nonetheless, as our research has revealed (Cameron 2011, 2012; Cameron et al. 2013; Dibley 2011; Dibley and Neilson 2010; Salazar 2011), science museums and centers rely to a large extent on the science of climate modeling to articulate narratives of climate change crises and inform visitors, audiences and publics on how "disastrous climate change" could be avoided by altering the way we live. As evidenced in our research, conventional narratives of the future and climate change in museums and science centers are dominated by an emphasis on behavioral change, where reducing levels of greenhouse gases in the atmosphere is the way to mitigate and adapt to the planet's climate variations. An example of this may be seen in the exhibition *Climate Change: Our Future, Our Choice* produced in 2009 at the Australian Museum, Sydney. As Cameron argues (2011) this exhibition deployed "a behavioral psychological mitigation imaginary disciplining the responsible individual to Do Something to reduce their carbon footprint to secure a precarious future as opposed to Doing Nothing, leading to inevitable climate catastrophe (Cameron 2011, 91). Sometimes using narratives of fear and catastrophe, at other times using creative multimedia

tools, conventional programming in museums have focused on showing that taking small individual steps toward reducing individual footprint on the environment—such as reducing consumption or using public transport—can make a difference.

The elephant in the room here is that the problem has less to do with individual behavioral change and much more with sustained long-term collective action. Actually, the message that is not being heard loud and clear is that the scale of the political, social and technological transformations necessary to mitigate and adapt to climate change are so large and profound that they are beyond the reach of individual action. Furthermore, as Beck et al. propose, mitigation and adaptation to climate change are, in essence, a call "for a globalized change of consciousness and practice," which requires a "possible emergence, locally and globally, of 'cosmopolitan communities of climate risk' in response to a 'world at risk'" (Beck et al. 2013, 1).

One root of the problem might be the dominance of climate models in prompting climate change narratives. Mike Hulme has convincingly shown how numerical climate models "have become central to the unfolding story of climate change" (Hulme 2013, 30), gaining and exercising a degree of authority that can shape strategic political narratives of climate change, animate new global social/environmental movements, and fuel enduring modes of cultural and political skepticism. From a similar stance Wilkinson and Mangalagiu (2012) have argued that we now rely too heavily on model-based forecasting and prediction to justify future-minded action. For Hulme, there are two interrelated dimensions to the authority of climate models—or what Hastrup and Skrydstrup (2013) have termed "the social life of climate change models." On the one hand climate models derive their epistemic authority by representing reality through abstractions and simplifications from mathematical expressions of physical laws. On the other hand, climate models gain social authority in the processes and interactions between scientific practices, cultural performances, and political interests (Hulme 2013, 31). As specific processes of modeling, climate futures models are practices that lead to particular configurations of climate knowledge (Hastrup 2013). In this regard, science museums and centers become important nodes within larger sociopolitical networks through which the epistemic authority of climate futures modeling circulates and is deployed in the politics of climate change knowledge. As regards climate change, Beck et al. argue, "the future is the shifting horizon at which issues of knowledge and social action converge. Widespread conceptions of a threatening future (what will be) condition what people judge should happen, and vice versa" (2013, 10).

As is the case, global change science "has placed its trust in metrics" (Robin et al. 2013) and museums and science centers have extensively relied on scientific knowledge to ascertain climate change as a global phenomenon that deserves our full attention. The implicit risk in this process however, as critics have pointed out, is the potential decoupling of knowledge from

meaning (see Jasanoff 2010). The authority of science, Sheila Jasanoff states, is not a given and scientific knowledge comes to be authoritative in precise and specific political settings. Some of the key challenges for science museums and science centers in the presentation of climate change have been how to structure the public understanding of climate change framework without obliterating other forms and practices of knowledge. As Jasanoff notes, a public understanding of science framework,

> diminishes civic agency, erases history, neglects culture and privileges people's knowledge of isolated facts (or their ignorance of such facts) over the mastery of more complex frames of meaning. It reduces human cognition to a one-dimensional scale. It makes no allowance for the multivalency of interpretation. (Jasanoff 2005, 270)

This brings us to the question of how to develop alternative configurations of climate knowledge, or what Hastrup calls modes of "emplotment" through which data becomes stories. Climate stories "depend on a particular plot for them to be convincing, meaning comprehensive and sufficient for people to take them at face value" (Hastrup 2013). Different plots will differ according to place and circumstance. In other words, different plots are construed from local contexts and realities. This is why museums need to rely less on presenting audiences with information and more on creating and designing richer experiences. In the field of experience design, creating rich experiences can shape certain behaviors, triggering emotional responses that can leave a lasting impression. Climate futures require approaches "that are not only characterized by calculability and risk, but also mobilize imaginative acts that open new spaces and practices for dealing with the effects of living with uncertain futures" (Yusoff and Gabrys 2011, 518). Designing richer experiences of climate change ought to transcend scientific data to enable a sensory-enhanced mode for anticipating futures "encompassing joy, wonder, and delight, rather than just pressing the buttons of fear and guilt" (Cameron et al. 2013, 19).

DEVELOPING ANTICIPATORY PRACTICES AND SOCIO-ECOLOGICAL IMAGINARIES IN MUSEUMS AND SCIENCE CENTERS

What makes the future fragile, argues Marilyn Strathern, "is not just the chronic 'uncertainty' of climate change but the need to translate abstract models into working practices, and back again" (Strathern 2008, 461). On top of sometimes overestimating the role that modeling plays in narrating climate change to citizens, there lies a second hindrance for science museums and centers to tackle. This relates to the ways in which climate change has been framed as primarily a problem of the future (even when there is strong

evidence for it already taking place in the present). Despite the fact that climate change continues to penetrate mainstream politics and culture as "a new spectre haunting the 'globe'" (Szerszynski and Urry 2010, 1), the future (when climate change will supposedly take place) has perpetually deferred the everyday present. In order to understand how anticipatory action functions Ben Anderson is of the opinion that we must understand the presence of the future, or what he sees—following Massumi—as the ontological and epistemological status of "what has not and may never happen" (Massumi 2007 in Anderson 2010, 779).

So what kinds of affects and emotions do anticipatory practices invoke in people and how can museum and science centers use anticipatory practices to create the spaces to debate and forge alternative socio-ecological imaginaries? By this I mean, following Jasanoff and Kim, those "collectively imagined forms of social life and social order" (2013, 190), which act as "powerful cultural resources" that in this instance help shape social action in response to climate change. In effect, questioning the nature of expertise (the science of climate modeling) in no way implies an anti-science or anti-technology agenda, but a reframing of what constitutes dominant expertise. That is, recognizing new synergies between "expert" and "lay" knowledges in the framing of knowledge. This points out not only to epistemic divergences, but also to deep ontological differences.

This is how the very question of climate change storytelling becomes relevant when inquiring what people know about climate change, how is this knowledge acquired and whose knowledge is it anyway. Taking into account the local cultural particularities of how climate change is narrated and recounted is relevant when observing the increase in bottom-up action taking place outside the heavy top-down United Nations Framework Convention on Climate Change (UNFCCC) framework. What is at stake then, is to recognize that "the practices by which people deal with the challenge of projected climate changes may be based on statistical models and computer simulations or alternatively direct experiences of greater weather variability and intensified weather events. But, as noted by Hastrup, anticipated scenarios also build upon a knowledge that is captured in place names, memories, bodily sensations and stories (Hastrup 2013).

The main drawback in current mass media representations of climate change is the failure to provide publics with a way to challenge dominant discourses based on hegemonic scientific cultures, in order to recognize that the ways of producing knowledge, including science, are multiple, complex, chaotic, spatial and embedded in local social solidarities. Hence the relevance and significance of highlighting a diversity of imaginaries around climate change futures as a way to counter a single way of knowing about the environment often embedded within established paradigms of Western science.

As I have discussed elsewhere (Salazar 2011) there is a need to think of cognitive diversity among the agents of definition of climate futures. In this

regard, there is still a significant lack of "cognitive justice" (Visvanathan 2005) in climate change debates. Visvanathan uses this notion of cognitive justice to introduce a major ethical dimension to the communication of climate change, and science more generally. The notion of cognitive justice refers to a questioning of the lack of the acknowledgment and dialogue between different knowledges and perspectives held by scientific knowledge and other epistemologies (Visvanathan 2005). Hitherto Visvanathan argues for the right for different forms of knowledge and their associated practices and ways of being to coexist.

This problem opens up a potentially interesting challenge for museums and science centers: that is, the possibility for opening up spaces where practicing alternative modes of anticipating futures are made possible; spaces within which people may attempt at imagining immediate and more distant futures. Examples of these interests can be found in the previously mentioned exhibition *Climate Change: Our Future, Our Choice*, where an innovative anticipatory strategy was to write the evening news for a given day in 2050, guiding visitors to imagine the future in concrete ways (Cooper 2009). Other examples worth mentioning include: *Lifestyle 2050* (Japan's National Museum of Emerging Science and Innovation); *Science Fiction, Science Future* (SciTech, Perth, Australia); the already mentioned *Climate Change: Our Future, Our Choice* (Australian Museum, Sydney); *Future Earth* (Science Museum of Minnesota, USA). These exhibitions provide normative scenarios for making visible visions of the future and the decisions on which they are based. But still, these are exhibitions curated by experts, given preeminence to certain futures and not others. An interesting example of a participatory multi-scale scenario approach is the one put forward by Shaw et al. (2009) who, in a study conducted in British Columbia, Canada applied "a participatory capacity building approach for climate change action at the local level where the sources of emissions and the mechanisms of adaptation reside and where climate change is meaningful to decision-makers and stakeholders alike" (Shaw et al. 2009, 448). The multi-scale scenario approach consisted of synthesizing global climate change scenarios, downscaling them to the regional and local level, and visualizing alternative climate scenarios out to 2100 in 3D views of familiar, local places. In approaches like these, the focus of attention shifts, as Ulrike Felt would argue, "from the future as 'temporally stable object' to be constituted, followed and continually (re)performed, to the processes of doing and undoing futures—thus to the activities of futuring and the sites where these happen" (Felt 2011, 2). In other words, as anticipating changing climates poses uncertainties of an unprecedented magnitude to people, it is necessary to think about new ways for expanding publics' social imaginaries of climate change. Citizens as agents of knowledge also project a socio-ecological imaginary of the future of the environment that enacts "that common understanding which makes possible common practices and a widely shared sense of legitimacy" (Taylor 2002, 106). Creating futures is

a daily and everyday occurrence, hence the importance of "specific locally/culturally framed future making practices" (Felt 2011, 2). In everyday life, anticipation implies a day-to-day forecasting of practical possibilities on the one hand, and a concern with more distant futures and possible scenarios on the other. For social agents to act consistently and to take responsibility for their community, they need to have reasonably well-founded expectations to the future. As Kerstin Hastrup notes, "the question of scale is linked to particular knowledge practices, and it is shown how the general human capacity for anticipation is shaped and stretched within such practices" (Hastrup 2013, 1).

If science museums and centers can assist in developing the necessary skills for living in the Anthropocene, attention must be placed on how to develop effective anticipatory practices through designing creative and innovative experiences. This entails moving beyond an emphasis on science education and information, toward a more holistic and integral approach that brings together through dialogues and trialogues (Hodge, this volume) the physical, social, cultural and emotional dimensions of climate change. An overview of programming in museums and science centers shows that effective communication of climate change that inspires action is the result of an engagement with publics inside and outside the museum/center. As we have shown elsewhere these cut across a wide range of practices: exhibitions, hands-on exhibits and science demonstrations, educational labs and pedagogical materials, workshops with school groups, lectures and debates involving scientists and the general public, forums and citizens' conferences, film and video festivals, digital storytelling workshops, digital games and using social media tools and P2P networks (Cameron et al. 2013). As knowledge apparatuses, museums have shifted timorously in recent decades toward more participatory perspectives that validate, and occasionally give prominence to, community content as authoritative cultural knowledge. Participatory culture has been greeted with enthusiasm in recent museum scholarship (Stein 2012) and contemporary research on social media in museums has provided new insights on the relationship between social media, cultural institutions and digital participation (Russo et.al 2008).

However, participatory culture also poses challenges for the role of museums and science centers and their place amid a complex communicative ecology. A key question still surrounds the changing nature of authority and the participatory expectations of society within museums (Stein 2012). As I have argued elsewhere (Salazar 2010), this first wave of scholarship examining how social media comes into play in museums has yet to provide a critical examination that addresses the cultural politics and political economy of the digital. Much of current research around new media in museums still fails to provide an in-depth examination of civic-driven participation in the digital realm. In an age of new media Carpentier (2007) complaints, the term participation, seems to have been stripped of its political connotations, coinciding with a slippage in the use of the term interactivity.

Interactivity is not only a responsive activity within programmed boundaries but must be thought of as interaction (in terms of change and negotiation). If civic-driven participation is, above all, a question of empowerment where publics exercise the power of decision making and are fully involved in the formulation of policies and plans, then participation remains absent in much of the decision-making processes in museums in relation to public culture.

Nevertheless, there are important examples of how museums and science centers are using their collections, developing new experience-based scenarios in exhibition development, and encouraging debate to engage visitors in anticipatory practices of visualizing global futures scenarios through which they may re-imagine and reshape their lives in a world profoundly altered by climate change. One noteworthy example is *The Science of Survival—Your Planet Needs* was an exhibition held in 2008 at the Science Museum, London, now one of the top visitor attractions in the UK. The exhibition can be in many ways considered as representative of contemporary approaches to exhibiting global change in science museums/centers. The exhibition was the third in a series, which included *The Science of Aliens* and *The Science of Spying* and focused on the theme of survival and adaptation in the context of global change, resource scarcity and energy depletion. Using climate modeling and financial forecasting tools, the exhibition allowed visitors to design their own sustainable city in the year 2050. The interactive exhibition presented the latest science (based on the 4th assessment report of the IPCC in 2007) to inform and educate visitors and aimed to provide insights into what individuals could do to make a difference. Yet, while informing on important facts, the exhibition worked as a one-off campaign, failing to generate a deep sense of change of consciousness and practice.

Ben Anderson's recent work on "future geographies" (2010) offers a promising framework to inquire how museums and science centers, as institutions at the heart of contemporary liberal democracies, turn to the question of how the future animates the contemporary condition as we struggle to predict and/or determine which futures and whose futures. Anderson's framework is useful to examine an exhibition such as *The Science of Survival* as an epitome of contemporary climate change programs in science museums and centers. As an archetype exhibition on global change futures informed by climate science, *The Science of Survival* clearly attends to how futures are "disclosed and related to through statements about the future; rendered present through materialities, epistemic objects and affects; and acted on through specific policies and programmes" (Anderson 2010, 779).

Anderson's main argument is that futures are anticipated and acted on through the assemblies of *styles, practices* and *logics*. *Styles* refer to those statements "through which 'the future' as an abstract category is disclosed and related to." In other words, statements function "to disclose a set of relations between past, present and future and self-authenticate those relations," thus problematizing "the future" in particular ways, that condition

how it may be anticipated, intervened on and acted upon (Anderson 2010, 779–780). Once again—as is the case with most contemporary exhibitions on climate change—the styles, or statements, being presented in *The Science of Survival* is that we still have a choice. Climate change in effect can be avoided or reverted by altering the way we live. However, the exhibition does little to break away from conventional narratives of the future by overstating the prominence of science education for individual behavioral change. As we have noted elsewhere (Cameron et al. 2013), museums and science centers' visions of the future must be balanced with optimistic perspectives in which action is seen as plausible and possible. *The Science of Survival* is a good example of this. However, the exhibition is still framed as a one-off museum exhibition that in many ways resembles a one-off campaign that comes and goes on the basis of a target output.

Practices on the other hand, refer to acts of calculating, imagining and performing, which, as modes of practice, give content to specific futures and through which futures are made present in affects, epistemic objects and materialities. In the previous section I briefly analyzed the social and epistemic authority of objects such as climate models, which are enacted as calculating practices for preempting possible and probable futures. But the exhibition in question also allows visitors to perform their futures in very innovative ways through the use of interactive media technologies. In doing so they were motivated to learn about how different possible renewable energies sources in the future compare, or about sustainable modes of transport and food production/consumption. In this very specific sense, in the space of the exhibition, visitors were invited to perform what Tony Bennett many years ago termed "an anticipatory futuring of the self" (Bennett 1991, 37). In this regard, the exhibition allowed visitors to see the 2050 neighborhood they built come alive on a big screen at the end of the exhibition, showcasing a future city from data collected from all visitors in order to attempt to reveal how everyone's potential lifestyles combine to affect collective futures. Nevertheless the exhibition seems to again rely on the science of climate modeling and financial forecasting tools, hence favoring certain epistemic objects over others.

The third element in Anderson's futures framework refers to *logics,* which he defines as a "programmatic way of formalizing, justifying and deploying action in the here and now" (Anderson 2010, 780). He identifies three types of anticipatory action—or logics—through which futures are enacted in the present: *precaution, preemption* and *preparedness,* which he claims are central in the governance of a range of events, conditions and crises (Anderson 2010, 780).

To exemplify this framework we turn again to the *Science of Survival* exhibition, where the Climate Group (www.theclimategroup.org), a specific group of experts, was enlisted to provide the science support. As an independent, not-for-profit organization founded in 2004 with offices in North America, China and Europe, the organization claims to work internationally

with government and business leaders to advance climate change solutions and accelerate a low carbon economy. Drawing again on Hulme's analysis of the social life of climate models as discussed in the previous section, it could be argued that the exhibition becomes part of a larger epistemic network with implicit hierarchies of expertise involved (Hulme 2013). The exhibition also enters and circulates through specific financial networks, hence the importance of drawing our attention to the politics of climate change exhibition funding in science museums and centers. *The Science of Survival* exhibition was sponsored primarily by Nissan, one of the world's largest car manufacturers; BASF, one of the world's largest chemical companies; and HSBC, one of the world's largest banking and financial services organizations; three corporations fuelled by those fossil-fuel dependent industries who are largely responsible for increased GHG emissions, which operate in the absence of uniform regulations and mandatory controls. This is an extremely significant and politically sensitive issue because, as a recent study shows (Heede 2013), nearly two-thirds of historic carbon dioxide and methane emissions can be attributed to ninety corporate and state-owned entities that are ultimately responsible for producing the fossil fuels and cement that are the primary sources of anthropogenic greenhouse gases. These are companies that often place themselves at the heart of those exploring new business opportunities from climate change whereby they revenue from selling new solutions to citizens and consumers to mitigate and respond to environmental disasters. As Anderson reminds us, "acting in advance of the future is an integral, yet taken-for-granted, part of liberal-democratic life" (Anderson 2010). And for these three companies it is a vital measure of their success into the future.

CONCLUSIONS

> An awareness is growing: long-term futures hinge on how we humans assemble with things that can unexpectedly reconfigure in a matter of micro-seconds. We are beginning to sense the necessity of acknowledging forces that extend deep below the earth's surface, and the relevance of timescales that exceed human time. As we begin to respond, we are prompted to consider: what if anticipating geologic scales of force, change and effect became a common design specification? What if energy production, policy-making, and infrastructure design projects began to account for lively and wildly unpredictable geologic actants?
>
> (Jamie Kruse 2013, 216)

Over the course of the first decade of the twenty-first century, we are coming to terms with learning that the emerging worlds we inhabit appear more and more beyond our control (c.f. Beck 2006). According to Mike Hulme

(2009), climate change is not a problem that can be solved, but a reality we must anticipate in order to adapt to it. In overcoming the tension between "learning *about* the future" and "learning *with* multiple futures" we being to learn how to live in the Anthropocene. And as Gibson-Graham and Roelvink (2009) remind us, learning "not in the sense of increasing a store of knowledge but in the sense of becoming other, creating connections, and encountering possibilities that render us newly constituted beings in a newly constituted world" (2009, 322).

The main interest in this chapter has been asking, "How can science museums and centers make sense of this present condition of continuous change and the emerging worlds being anticipated by global change science?" Further attention and empirical research will be required to better understand how the museum sector can make use of anticipatory strategies and future-making practices to move beyond science education to address the physical, social, cultural and emotional dimensions of climate change and to shape our understandings of specific social problems, speculations of these problems and projected solutions to them. Most importantly, what sort of modes of existence do they imply that may move beyond the logics of fear and uncertainty about the future that often end up introducing projects of management and control.

To instigate a response I have emphasized that cultural institutions should pay more attention to the use of anticipatory practices that may invite citizens to engage with issues that affect their futures and prepare them for a life that is already beginning to transcend planetary boundaries.

Climate modeling has, so far, provided the preferred logic of anticipation through which museums develop programming on the certainties and uncertainties of future socio-ecological scenarios. I have argued that for museum and science centers it is imperative to expand the geographies of socio-scientific futures if they are to convey for the cosmopolitics of climate change and the ways in which certain kinds of futures are made and circulated, while other are obliterated and excluded (see Felt 2011, 2). This entails that, by being more attentive to polycentric approaches within a range of civic epistemologies of climate change, museums must be able to go beyond discourses of mitigation and adaptation to also engage in anticipatory practices that may provide a better understanding of how people think about the worlds emerging around them. Or as Mark Nuttall observes, how people "orient themselves toward the future, and how they create and enact change within a world that is constantly becoming and being remade" (Nutall 2010, 22).

What can be expected from the museum sector is a consideration of how to be part of developing long-term processes of anticipatory and participatory politics of thinking global change? As has been argued, "museums and science centers can engage a future-oriented, forward thinking frame, as places to link the past to the far future through anticipatory practices of

what might happen as places to offer practical governance options and as places to present long-term temporal trajectories" (Cameron et al. 2013, 3). In this regard, museums and science centers must consider the opportunities of connecting with existing local networks, where the museum or science center becomes part of a larger ecology (social and technological) of communication. This also entails thinking whether and how science museums and centers may bring together cosmopolitan communities of risk, thinking that such communities, as Beck et al. argue, "may afford new social, political, cultural and techno-economic possibilities of responding to climate change in the construction of more attractive, more sustainable, and less unequal and exploitative futures" (Cameron et al. 2013, 5).

What emerges from it is that a normative perspective is required to examine the role that science museums and centers ought to play in engaging citizens with the complexities of climate change: how it is being imagined, contested, pre-empted, known, and mobilized across differing perspectives and knowledge practices.

REFERENCES

Anderson, Ben. 2010. "Preemption, Precaution, Preparedness: Anticipatory Action and Future Geographies." *Progress in Human Geography* 34(6): 777–798.

Beck, Ulrick. 1992. *Risk Society: Towards a New Modernity*. London: Sage.

Beck, Ulrick. 2006. "Living in the World Risk Society." *Economy and Society* 35(3): 329–345.

Beck, Ulrick, Anders Blok, David Tyfield and Joy Yueyue Zhang. 2013. "Cosmopolitan Communities of Climate Risk: Conceptual and Empirical Suggestions for a New Research Agenda." *Global Networks* 13(1): 1–21.

Bennett, Tony. 1991. "The Shaping of Things to Come: Expo '88." *Cultural Studies* 5(1): 30–51.

Boykoff, Maxwell T. 2011. *Who Speaks for the Climate? Making Sense of Media Reporting on Climate Change*. Cambridge: Cambridge University Press.

Boyce, Tammy, and Justin Lewis. 2009. *Climate Change and the Media*. New York: Peter Lang.

Cameron, Fiona R. 2011. "From Mitigation to Creativity: The Agency of Museums and Science Centres and the Means to Govern Climate Change." *Museum and Society* 9(2): 90–106.

Cameron, Fiona R. 2012. "Climate Change, Agencies and the Museum and Science Centre Sector." *Museum Management and Curatorship* 27(4): 317–339.

Cameron, Fiona R., Bob Hodge, and Juan Francisco Salazar. 2013. "Representing Climate Change in Museum Spaces and Places." *Wiley Interdisciplinary Reviews: Climate Change* 4(1): 9–21.

Carpentier, Nico. 2007. "Participation, Access, and Interaction: Changing Perspectives." In *New Media Worlds: Challenges for Convergence*, edited by Virginia Nightingale and Tim Dwyer, 214–230. Melbourne: Oxford University Press.

Carvalho, Anabela. 2007. "Ideological cultures and media discourses on scientific knowledge: Re-reading news on climate change." *Public Understanding of Science* 16(2): 223–243.

Cooper, Catherine. 2009. "Thumbs up for climate change exhibition." *Australian Museum,* last modified December 9. http://australianmuseum.net.au/BlogPost/Science/Thumbs-up-for-climate-change-exhibition#sthash.Qfqn7Qmz.dpuf

Díaz Nosty, Bernardo. 2009. "Cambio climático, consenso científico y construcción mediática. Los paradigmas de la comunicación para la sostenibilidad." *Revista Latina de Comunicación Social* 64: 99–119.

Dibley, Ben. 2011. "Museums and a Common World: Climate Change, Cosmopolitics, Museum Practice." *Museum and Society* 9(2): 154–165.

Dibley, Ben and Brett Neilson. 2010. "Climate Crisis and the Actuarial Imaginary: 'The War on Global Warming'." *New Formations* 69: 144–159.

Ellsworth, Elizabeth, Jamie Kruse, and Reg Beatty. 2013. *Making the Geologic Now.* Brooklyn, NY: Punctum Books.

Felt, Ulrike. 2011. "Geographies of Technoscientific Futures: Anticipatory Work, Emerging Technologies and Technopolitical Cultures." Keynote address at *Governing Futures: Imagining, Negotiating, Taming Emerging Technosciences International Conference,* Vienna, Austria, September 22–24, 2011.

Freire, Paulo. 2006. *Pedagogy of the Oppressed. 30th Anniversary Edition* (trans. Myra Bergman Ramos). New York: Continuum.

Gibson, William. 1999. "The Science in Science Fiction." *National Public Radio,* last modified November 30. www.npr.org/templates/story/story.php?storyId=1067220

Giroux, Henri. 2003. "Public Pedagogy and the Politics of Resistance: Notes on a Critical theory of Educational Struggle." *Educational Philosophy and Theory* 35(1): 5–16.

Graham-Gibson, J.K., and Gerda Roelvink. 2009. "An Economic Ethics for the Anthropocene." *Antipode* 41: 320–346.

Hansen, Anders and Julie Doyle. 2011. "Communicating the Environment." *International Communication Gazette* 73(3): 3–6.

Harbinson, Rod. 2006. *Whatever the weather. Media Attitudes to Reporting Climate Change.* Panos Institute Report. London.

Hastrup Kirsten. 2013. "Anticipating Nature: The Productive Uncertainty of Climate Models." In *The Social Life of Climate Change Models: Anticipating Nature,* edited by Kirsten Hastrup and Martin Skrydstrup, 1–29. New York & London: Routledge.

Heede, Richard. 2013. "Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854–2010." *Climatic Change.* doi:10.1007/s10584–013–0986-y

Hulme, Mike. 2009. *Why We Disagree about Climate Change.* Cambridge: Cambridge University Press.

Hulme, Mike. 2013. "How Climate Models Gain and Exercise Authority." In *The Social Life of Climate Change Models: Anticipating Nature,* edited by Kirsten Hastrup and Martin Skrydstrup, 30–44. New York: Routledge.

Intergovernmental Panel on Climate Change. 2013. Fifth Assessment Report. Available online www.ipcc.ch/report/ar5/

Jasanoff, Sheila. 2005. *Designs on Nature; Science and Democracy in the United States and Europe.* Princeton, NJ: Princeton University Press.

Jasanoff, Sheila. 2010. "A New Climate for Society." *Theory, Culture & Society* 27(2–3): 233–253.

Jasanoff, Sheila. 2011. "Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology." In *Oxford Handbook of Climate Change and Society,* edited by John S. Dryzek, Richard B. Norgaard, and David Schlosberg, 129–143. Oxford: Oxford University Press.

Jasanoff, Sheila, and Sang-Hyun Kim. 2013. "Sociotechnical Imaginaries and National Energy Policies." *Science as Culture* 22(2): 189–196.

McGrail, Stephen. 2013. "Climate Change and Futures Epistemologies: Tensions, Trends and Possibilities in Climate Discourses Epitomised by Three Prominent Climate Experts." *Journal of Futures Studies* 17(3): 21–40.

Mackenzie, Adrian. 2013. "Programming Subjects in the Regime of Anticipation: Software Studies and Subjectivity." *Subjectivity* 6(4): 391–405.

Moser, Susanne. 2010. "Communicating Climate Change: History, Challenges, Process and Future directions." *Wiley Interdisciplinary Reviews: Climate Change* 1(1): 31–53.

Nightingale, Katherine. 2008. "Southern Collaboration 'Key to Adaptation'." *SciDev Net,* June, 13. Available online www.scidev.net/global/climate-change/news/southern-collaboration-key-to-adaptation-says-clim.html

Nuttall, Mark. 2010. "Anticipation, Climate Change, and Movement in Greenland." *Études/Inuit/Studies* 34(1): 21–37.

Ostrom, Elinor. 2009. "A Polycentric Approach for Coping with Climate Change." *World Bank Policy Research Working Paper Series 5095.*

Robin, Libby. 2011. "The Global Challenge of Climate Change: Reflections from Australian and Nordic Museums." *reCollections* 6(2). Available online http://recollections.nma.gov.au/issues/vol_6_no_2/commentary/global_challenge_of_climate change

Robin, Libby, Sverker Sörlin, and Paul Warde. 2013. *The Future of Nature: Documents of Global Change.* New Haven, CT: Yale University Press.

Rockström, Johan, Will Steffen, Kevin Noone, Åsa Persson, Stuart Chapin, Eric Lambin, Timothy Lenton, Marten Scheffer, Carl Folke, and Hans Joachim Schellnhuber. 2009. "A Safe Operating Space for Humanity." *Nature* 461(7263): 472–475.

Russo, Angelina, Jerry Watkins, Lynda Kelly, and Sebastian Chan. 2008. "Participatory Communication with Social Media." *Curator: The Museum Journal* 51(1): 21–31.

Salazar, Juan Francisco. 2010. "MyMuseum: Social Media and the Engagement of the Environmental Citizen." In *Hot Topics, Public Culture, Museums,* edited by Fiona Cameron and Lynda Kelly, 265–280. Cambridge: Cambridge Scholars Press.

Salazar, Juan Francisco. 2011. "The Mediations of Climate Change: Museums as Citizens' Media." *Museum and Society* 9(2): 123–135.

Schmidt, Andreas, Ana Ivanova, and Mike Schäfer. 2013. "Media Attention for Climate Change around the World: A Comparative Analysis of Newspaper Coverage in 27 Countries." *Global Environmental Change* 23(5): 1233–1248.

Shaw, Alison, Stephen Sheppard, Sarah Burch, David Flanders, Arnim Wiek, Jeff Carmichael, John Robinson, and Stewart Cohen. 2009. "Making Local Futures Tangible—Synthesizing, Downscaling, and Visualizing Climate Change Scenarios for Participatory Capacity Building." *Global Environmental Change* 19(4): 447–463.

Sörlin, Sverker and Paul Warde. 2009. *Nature's End: History and the Environment.* Houndmills, UK: Palgrave Macmillan.

Stein, Robert. 2012. "Chiming in on Museums and Participatory Culture." *Curator: The Museum Journal* 55(2): 215–226.

Strathern, Marilyn. 2008. "Robust Knowledge and Fragile Futures." In *Global Assemblages: Technology, Politics, and Ethics As Anthropological Problems,* edited by Aiwha Ong and Stephen J. Collier. Malden, MA: Blackwell Publishing. AuQ12

Szerszynski, Bronislaw, and John Urry. 2010. "Changing Climates: Introduction." *Theory, Culture & Society* 27(2–3): 1–8.

Taylor, Charles. 2002. "Modern Social Imaginaries." *Public Culture* 14(1): 91–124.

Vasconcelos, Vitor, Francisco Santos, and Jorge Pacheco. 2013. "A Bottom-Up Institutional Approach to Cooperative Governance of Risky Commons." *Nature Climate Change* 3(9): 797–801.

Vaughan, Adam. 2013. "Public Concern for Environment Lowest in 20 years." *The Guardian,* February 28. www.guardian.co.uk/environment/2013/feb/28/public-concern-environment

Visvanathan, Shiv. 2005. "Knowledge, Justice and Democracy." *Science and Citizens: Globalization and the Challenge of Engagement,* edited by Melissa Leach, Ian Scoones, and Brian Wynne, 83–94. London: Zed Books.

Wilkinson, Angela and Diana Mangalagiu. 2012. "Learning with Futures to Realise Progress towards Sustainability: The WBCSD Vision 2050 Initiative." *Futures* 44(4): 372–384.

Yusoff, Katherine and Jennifer Gabrys. 2011. "Climate Change and the Imagination." *Wiley Interdisciplinary Reviews: Climate Change* 2(4): 516–534.

7 Tools for Alternative Temporalities

Gareth Priday, Tim Mansfield and José Ramos

INTRODUCTION

In "The Climate of History," Chakrabarty (2009) discusses various difficulties in the encounter between the historical reality of climate change and the disciplines of history and political economy. Natural history and human history have always been considered separate endeavors, with very different perspectives, and most discourse around climate change has emerged from the physical and, to some extent, biological sciences. For scholars in the humanities, the geological environment of human beings has largely been considered static, or at least changing so slowly as to appear static—a reasonable assumption since almost all consideration of human culture is restricted to the fairly stable geological Holocene period.

But anthropogenic climate change implies the emergence of human beings as global geological agents and the possible shift to a new period, the Anthropocene—which creates conflict between humans and natural history for the first time. Chakrabarty points out several consequences of this, among them different conceptions of temporality, meaning all the ways of understanding and speaking about time, whether events can be considered from within or only from without, different conceptions of the human and humanity, etc.

These kinds of radical, cross-perspectival encounters and contending frames of time are typical of conversations in our discipline of Foresight, or Futures, Studies. As museums seek to face the challenges of contributing to the public discourse around climate change, formulating ways to foster these encounters and work with different kinds of temporality and other background assumptions seems crucial.

This chapter introduces the reader to some basic futures concepts and techniques. We explore the ideas of multiple layers and types of temporality and how this applies to museums. We give some examples of the ways emerging communications tools in Futures Studies and museums are already converging. We also provide a short case study of a direct encounter between museum professionals and Futures Studies techniques in an experiential workshop, and we conclude with some ideas for linking Futures Studies and research with museum practice around climate change.

POSSIBILITIES

What Is Futures Studies?

Imagining the future is a defining human characteristic and may be one of the few things that set us apart from other animals (Suddendorf and Corballis 2007). Evidence of human-oriented future thinking in ancient times survives in ceremonies and artifacts across the globe. If future thinking is a human characteristic and has been part of our societal practice for so long, what is the contribution of Futures Studies (sometimes known as Strategic Foresight, or "Futures"), which is a relatively recent field of study (Bell 2005)?

Noted Futures practitioner Richard Slaughter1 provides the view that, "Strategic Foresight is the ability to create and sustain a variety of high quality forward views and to apply the emerging insights in organizationally useful ways." Bell (2005) proposed that the "distinctive contribution of futurists is prospective thinking" and that the purposes of Futures is "to discover or invent, examine and evaluate, and propose possible, probable and preferable futures." Voros (2007) adds that "It is not the future which is the object of inquiry in futures—rather, it is the plurality of ideas about or images of the future which human beings have in the present which constitutes the object domain of Futures inquiry."

Futures is not about prediction, rather it is about exploring the possibilities of alternative futures that allow us to make changes to the way we act in the present. There are many organizations in the world that do just that by using Futures methods to inform the development of their strategic plans, policies and organizational purpose. Examples include: government organizations (European Foresight Platform 2014), businesses (Deutsche Post DHL 2012) and nongovernmental organizations (King's College, London 2014). As we will see, there are several museum organizations using Futures tools and techniques as a way of exploring museum futures.

One of the key contributions of Futures Studies has been to show how temporality, how we understand past, present and future, is not a singular and monolithic affair. Indeed, temporality as experienced and documented by Futures researchers is diverse and complex. The time horizons which Futures researchers use can vary from years to decades to centuries, which depend on the context within which they work (Brier 2005).

Generating useful alternative futures requires effort and there is a substantial body of practice and theory to aid this process. This typically has three broad components:

1. Looking for "seeds of change"
2. Deepening our understanding through analysis and interpretation
3. Generating alternative futures

These steps inter-relate and there's a flow back and forth between the different steps. The first step is to "scan" (a technique known as "environmental

scanning") for changes in the world around us that might suggest different possible futures. These will include large-scale "drivers of change" such as climate change or resource constraints, trends and changes that are on a comparatively smaller scale called "emerging issues." Emerging issues are little seeds of a possible future in the present and are often found at the fringes of society, ignored or sidelined by mainstream media but some, not all, gain momentum and move into mainstream culture (Molitor 2010). Often people focus on new technologies, but changing social practices, behaviors, environmental, economic conditions and many other aspects are important in shaping our future.

The second set of tools helps us explore what might happen by deepening our understanding of the relationships. These tools help us get beyond the "gee whizz" of a new technology to ask, "What's really going on?" Armed with these drivers of change, emerging issues and our greater understanding of what they might mean, we can start generating different alternative futures. Usually our analysis of drivers of change and emerging issues suggest tipping points toward different futures.

This brings us to our third step in generating alternate futures. The aim here is to break away from the future as normally projected and generate alternatives, including those that may seem unlikely, or even ridiculous. Exploring these alternatives help us understand our assumptions in the present and expand the possibilities of what might occur. The more these futures challenge our assumptions, the more useful they often are. This is most commonly expressed through sets of "scenarios." Scenarios are stories about alternative futures, which challenge the dominant view. Our workshop design (described in more detail below) covered each of these three steps.

CONTESTED TEMPORALITY

Another dimension of the drivers of change and emerging issues is the speed of change (Gunderson and Holling 2002). What is the speed of change through which new policy and law is formulated among a political group? How different is this from the speed of cultural change? To query the Chinese proverb: Is it easier to move a mountain than to change a culture? Finally, discourses (whether popular or obscure) may express particular historiographical dimensions, ways in which the past is narrated and the future projected (Inayatullah 1998). For example, while cosmopolitan philosophers and historians narrate the rise and fall of the nation state, other conversations of an evolutionary nature may talk about the beginnings and ends of a species. What many Futures researchers find is that historiography, narrative, temporality and futures are implicit, contested and hidden in many disciplines and aspects of social life, only occasionally dredged up by accident or by necessity.

Three perspectives help provide an overview of how time can be analyzed across layers: positivist time sense, the embodied cognition of temporality, and post-structural temporality.

In physics, debate still exists on whether time is a physical property. For example, the theory of relativity puts forth the idea of space-time, using the metaphor of a "fabric." A positivist view of time attempts to derive an explanation of it as an "object" based on empirical data. The example provided by the theory of relativity is a useful beginning, however there are many more examples we can draw from: the movement of planets and stars, the time periods within which species have existed on earth, the rates of population change and migration among various species, the time period within which a radioactive substance will decay. The so-called hard sciences are replete with examples of various scales of time (the length of time—a nanosecond, ten years, 1,000 years), all of which have distinct implications on the future in their discrete dimensions.

Another perspective on the nature of temporality is from the point of view of situated or embodied cognition (Lakoff 1980; Thompson 2007):

- An organization in India, for example, which is working on the issue of eradicating castism, exists within a particular embodied cognition of temporality (Ramos 2010). Castism has existed for thousands of years; it is a persistent and embedded aspect of Indian culture. Depending on one's theoretical disposition toward the transformation of deep human structures, castism may not be so easy to change. A group such as this is embodying a particular temporality through the narrative they inherit (and construct) and by situating their project within a particular timeframe.
- In another example, a CEO from a major multinational corporation is obsessed with the next quarterly report. He knows that if the company shows major losses, his job is on the line.
- Finally, the Tellus Institute (2014)—concerned with the long-term sustainability of humanity—sponsors research projects that explore the full scope of the twenty-first century, and the strategies we need to take to address our collective planetary challenges.

These examples illustrate how the situated nature of human beings within cultural and institutional contexts is a fundamental factor in "temporalization." From this perspective, we can say that temporality is an expression of embodied cognition, each with distinct timescales and implicit assumptions about speeds of change.

A post-structural view on temporality further opens up the question of various discourses that have different historiographical dimensions:

- A textbook on anthropology offers Gerhard Lenski's overview of the evolution of economic systems, from hunter-gatherer, to herding, to agricultural and industrial modes.
- A cosmopolitan theory discusses the rise and fall of the nation state, and the emergence of the mega-city-state's dominance as the twenty-first-century political form (Falk 2005).

- An impassioned book on humanity's future survival argues that, in evolutionary terms, we are a "young" species, and "it's time to grow up" (Elgin 2005).
- A neo-Marxist history provides a 500-year overview of the development of capitalism, and explains the future as the development of intensive and distributed capitalism (Robinson 2004).

Different discourses hold implicitly distinct historiographies, periodizations (how history is punctuated by different eras), and by virtue of these, they carry distinct notions about how the future will be different from the present.

MUSEUMS AND NARRATIVES OF TIME

The museum has been a locale for developing these key narratives of change and transformation that have a profound influence on the public's understanding of itself through time. As Bennett (1995) argues, the transformation of the museum from the industrial period onward was typified by a dual process. First, the museum opened up as an inclusive and democratic institution where the masses could now participate. Secondly, their role as educator and disseminator of a new epistemically bound reality and truth (liberalism and evolutionism) increased. We might say that, historically, the museum has—by virtue of its power and legitimacy in relation to the state, its inclusiveness and engagement with a new and broad public, and as an expression of European science—played the role of a cultural vanguard, introducing socially radical (though scientifically accepted) new narratives into the social imaginary.

Natural history museums were a way of displaying the artifacts and indeed the evidence for the theory of evolution. Instead of just a repository of strange natural artifacts, Darwin's theory of evolution organized evidence into a powerful new scientific narrative that discredited prescientific notions of temporality.

Technology museums in the West have created another type of narrative: the triumph of industrial development and innovation. They provide a display of technological systems in their infancy, development and maturation. They also display, in Shumpeterian terms, the creative destructive dynamics of industrial development coupled with capitalist enterprise. While this has often been done in hegemonic terms, as progress, the new debate related to ecological challenges and technological risk opens up space for other narratives.

Museums of art are no less locales where narratives are curated and extended. The distinctions between classical, Renaissance, baroque, neoclassical, romantic, impressionistic, surrealistic and abstract are often subtle narrations of the transformation of rationality over time. The implicit

message within many of these curated spaces is the rupture or transformation from one mode of rationality to a higher or different mode of rationality (e.g., the often explained three dimensionality of Renaissance painting, which shows a fundamental development in spatial understanding). The history of thought / mind and aesthetics via this inflection point also points toward its future.

Whether museums have intended to or not, they have been vanguards of alternate temporalities—new narratives of past, present and future. Futures Studies offers new opportunities to more explicitly explore and develop museology's "time-making" role and potential, which several museums have already taken up.

MUSEUMS USING FUTURES STUDIES

Futures techniques are often used to inform strategy and there are several museums and related organizations using futures for this purpose. These include the Centre for the Future of Museums (American Alliance of Museums 2014). Their website has a wide range of materials looking at issues facing museums in the five- to twenty-five-year timeframe, most of which are informed by Futures techniques. This is constantly updated and although some of the literature is purely focused on the United States, much of it would apply in many countries, or would be a good place to source materials for a discussion on Futures.

A similar international organization is Museum3 (Museum3 2014), which is "a not for profit organization dedicated to exploring the future of the cultural institution sector." Although Museum3 does not seem to use Futures techniques as much, it does host many future-oriented discussions across an international community. The UK-based Museums Association[2] (Steel 2012) also recently published its vision for the future of museums in 2020.

Some museums are also using these techniques to inform their exhibits. The Deutsches Museum is running an Anthropocene Scenarios exhibit in 2014 which will:

> show both historical artifacts and current objects of scientific and industrial laboratories and integrate the audience by means of interactive demonstrations and direct participation through digital media. Both the exhibition and an accompanying program of events will offer the public a unique opportunity to experience the history, the present and scenarios of the future of our planet and to participate actively in the discussion on the Anthropocene. (Deutsches Museum 2014)

The Design Museum, London (2013) has developed scenarios and used these as mechanisms to develop different design artifacts that fit those notions

of the future. These "design fictions" are of interest to both museums and Futures Studies in effectively communicating ideas about the future.

COMMUNICATING THE FUTURE

The ability to communicate ideas about the future is a key aspect in any Futures exercise. Elements of communication are constructed through the exercise of thinking about our assumptions and creating alternatives. A set of futures scenarios—depicted in some combination of text, image and video are a typical way to communicate the synthesis of these elements.

A recent development in communicating Futures ideas is the use of design fiction and design futures as a way to bring these ideas to life. These fields attempt to use "artifacts" from the future or stories about the future brought to life through image, film and mocked up technological artifacts. These techniques could fit museums and similar institutions well as new methods of engaging with Futures material since they work with the traditional emphasis of museums on exhibiting artifacts. Design fiction was first noted around 2009—one of its earliest proponents was Julian Bleecker of the NearFuture laboratory:

> The conclusion to the designed fiction [is] objects with stories. These are stories that speculate about new, different, distinctive social practices that assemble around and through these objects. Design fictions help tell stories that provoke and raise questions. Like props that help focus the imagination and speculate about possible near future worlds—whether profound change or simple, even mundane social practices. Design fiction does all of the unique things that science-fiction can do as a reflective, written story telling practice. Like science fiction, design fiction creates imaginative conversations about possible future worlds. Like some forms of science fiction, it speculates about a near future tomorrow, extrapolating from today. In the speculation, design fiction casts a critical eye on current object forms and the interaction rituals they allow and disallow. (Bleecker 2009)

Since 2009, there are a growing number of futurists, filmmakers and designers using this practice (Raford 2012). There is a range of examples from the corporate-driven Microsoft (Microsoft Corporation 2012) view of the future to artistic experiments such as Superflux's short film and installation "Song of the Machine" (Pavlus 2011).

Another emerging practice in both Futures and museums is the use of games as a mechanism to increase engagement. In the Futures field this is seen in tools such as the "Foresight Engine" run by the Institute for the Future. In a recent lecture, Jane McGonigal, the creator of this software, recently proposed that museums also adopt this as a tool (McGonigal 2012).

The Foresight Engine invites participants to make short, Twitter-like statements of ideas about the future on a particular topic. Participants can then "play a card," either adding their ideas, building on others' ideas or asking further questions, gaining points and badges as they do so. McGonigal developed a "Find the Future Game" for the New York Public Library (New York Public Library 2011). The game was designed "to empower young people to find their own futures by bringing them face-to-face with the writings and objects of people who made an extraordinary difference" (McGonigal 2012). Other examples include "Murder at the Met" (Metropolitan Museum of Art 2014) and the San Francisco Museum of Modern Arts' use of the Super Going game (SFMOMA 2012) to build interactive experiences.

AuQ13

It seems that many of the emerging practices in Futures are also emerging practices in museums. Through our workshop experience, it also appeared that there was significant opportunity for use of more established Futures techniques in museums as well.

ENCOUNTER

Within this space of possibility for exchange between museum professionals and Futures practitioners, we found an opportunity for a direct encounter.

In 2011, the three authors were invited to run a Futures workshop for the Australian Science and Technology Exhibitors Network (ASTEN) annual conference held in Sydney. We proposed to conduct an interactive, futures workshop in which participants experience thinking about and communicating possible futures of Australian society and its artifact's in multiple ways.

Our aim for the workshop was to share with this group of museum professionals our "tools of trade" for breaking out of monological narratives of the future and instead to entertain multiple, possible futures, that is, techniques that allow greater specificity to the inquiry and which permit deeper questioning of current discourses. What we hoped to learn from them was some ways to experience futures rather than read them as abstract depictions. We hoped that we would challenge each other's thinking and practice in a mutual learning engagement.

One sensitivity we brought to the engagement was an observation that both Foresight researchers and museum professionals share a concern with "Big Time"—conceptions of both history and the future that stretch far beyond the usual time-frames familiar to our cultures. Another was that science and technology museums are unusual in that they are often called on to depict the future as well as the past and that the public demand is often to depict "The Future"—a canonical future which can be extrapolated from the present for our enjoyment or education.

The four specific tools we decided to share to try to break away from this singular future were:

1. The idea of scanning for "seeds of change," namely large-scale drivers of change, trends and emerging issues to inform possible futures
2. The concept of multiple "future scenarios" as a tool for divergent thinking
3. Ken Wilber's four-quadrant framework and its use for "incasting" a scenario of the future
4. Sohail Inayatullah's Causal Layered Analysis as a tool for deepening understanding of a future

We will outline the workshop process we used with the ASTEN participants and briefly discuss these tools and the outcomes of each stage of the workshop.

WORKSHOP OUTLINE

Our overall structure attempted to cover each of the main steps in the Futures process, looking at drivers of changes and some emerging issues, deepening our understanding and generation of alternatives. We adapted the program to match our time constraints and to bring the idea of communicating to different audiences into the workshop. We had approximately forty people present from several museums that were mixed up and split into different groups of six to eight people. The workshop moved through four distinct phases:

1. *Introduction to Futures*. A brief introduction to some of the ways Futures practitioners think about emerging futures, expanding the space of possibilities. These ideas of differing temporalities and alternate futures have been covered in the earlier sections of this chapter.
2. *Crafting a Future*. This movement was designed to generate alternative futures that are not represented in the normal future projections. To alleviate time pressures, we had developed "issue cards" with emerging issues, trend and drivers of change rather than asking the participants to conduct a scan for them, although they could add their existing knowledge if they chose. Each group selected a set of cards describing: a *theme* (e.g., Health, Media, Transport etc.) and three to four issue cards. We gave the groups time to talk about and develop a scenario about their theme.
3. *Deepening the Future*. The participants were guided through two techniques (Four Quadrants and then Causal Layered Analysis) the results of which were used to deepen and enrich the quality of the scenario they had generated.
4. *Exhibiting the Future*. Each group was asked to select an audience (we had snippets describing three groups—Modernists, Traditionalists and Cultural Creatives). We asked each group to demonstrate how they might communicate their scenario to that audience type.

CRAFTING A FUTURE

Scenarios

Future "scenarios" (Wack 1985a, 1985b) are fictional depictions of multiple, possible futures based in part on data and in part on the imaginations of workshop participants. Scenarios usually take the form of vignettes, often textual, sometimes in other forms such as short videos, which describe life in a possible future. Scenarios often include rich detail about the specific future, which is relevant to the organization, which commissioned them. They may also contain a step-wise narrative from the present day to the depicted future to explain the logic by which the future emerged.

Because the key concern with scenarios is to explore multiple, emergent futures, scenarios are typically developed in sets—between three and six scenarios are usual—which collectively describe a futures space—a zone of possibility. Scenarios may be developed by a range of techniques—for example, the GBN method (Schwartz 1991), the Manoa Method (Dator 2009) or Causal Layered Analysis (Inayatullah 2008). Scenarios are usually developed at the end of a futures process, here we decided to bring that aspect forward so that participants could spend more time to explore and generate alternate futures within our time limit.

Scenarios in Our Workshop

Scenarios are perhaps the most mainstream and well-known technique in the toolkit of the Futures practitioner, so we were eager to share this particular technique with the participants. We also felt that there is a potentially rich connection worth exploring between the job of a museum exhibitor and that of a Futures practitioner as a storyteller. Finally, we hoped to use scenarios as a way to allow participants to explore the idea of multiple, divergent futures in the hope that we would discover ways for this to enrich exhibition practice. The workshop broke the participants into several groups—each group developed a single scenario, so we explored the idea of multiple futures by making time for everyone to hear all the scenarios. The base scenario was developed from the theme and issues cards the group had selected. Having generated the base scenarios we went on to use two techniques to deepen the scenario they had generated.

DEEPENING THE FUTURE

We gave a brief outline of each technique, which the groups then used. Having gone through the process, the key insights were incorporated into the scenario. Causal Layered Analysis was introduced first, followed by Wilber's Four Quadrants.

Causal Layered Analysis (CLA)

Causal Layered Analysis (Inayatullah 2008, 2005) is a method of deepening the shared understanding of an issue by applying various lenses to it—factual, systemic, post-structural and mythic—which uncover progressively more foundational and longer-term factors underlying the issue in question.

The "Litany" level deals with blank facts, the stuff of straight news reports. It has the weakest, shortest-term effect on the issue, but tends to attract the most attention.

The "Systemic" level deals with the broader systems around the issue—the social and political systems, but also the physical and environmental systems. This is the domain of systems thinking and more in-depth journalism, popular journals and so on.

The "Worldview" level is uncovered by inquiries into discourse and power—Whose voice is empowered in this? Whose is disempowered? Where does advantage flow? How does the framing of the issue "cause" the issue? How can the framing of the issue be changed? All these questions lead the conversation towards the worldviews underlying current understandings of the problem. This is generally the domain of deeper scholarship.

The "Myth/Metaphor" level is constituted by archetypal, often unconscious stories and narratives—"God gave us the world so we could rule it," "Humans are out of balance with nature and should be punished"—which drive reactions at an emotional level.

Each layer deals with a different time frame of change, from the short term "just fix it" litany to the deep, long-term social change at the myth/metaphor level. We felt this layering of change was useful in understanding some of the deeper narratives of time embedded in museum exhibits.

CLA in Our Workshop

Because we are aware that most conversations about the future stay at the Litany level ("did you see that thing on the news?"), sometimes descending briefly to Systemic ("I actually read an interesting article in *New Scientist*"), we wanted to give our participants a brief experience of CLA to see that they could deepen their sense of an emerging future far beyond a normal conversation. We asked participants to generate ideas at each level in the form of headlines, causes, worldviews and myths that supported their particular scenario. This enabled the participants to deepen their understanding of the assumptions that underpinned their scenario and get a better sense, through the metaphors and myths, of what it might feel like to live in such a future.

Four Quadrants

One of the difficulties most groups face in doing Futures work is hidden, epistemic bias. Due to personality type, culture, disciplinary background, work focus and other factors, each of us tends to favor some kinds of information and ignore others. In Futures practice one of the key places this shows up is in Environmental Scanning—a data gathering method we use to find potential influences in the present day, which show signs of affecting emerging futures. A typical example is that a CIO in a large firm may scan "tech trends" on a daily basis, but have no awareness of cyclic, developmental or linear social changes which co-determine change in the technology sector.

One way to ameliorate the effects of these biases is to use a "scanning frame"—which in its simplest form is a set of categories in which we are seeking data. If some of the categories have a lot of data and others have none, the scanner knows to shift the focus of the scan to find more in the missing categories. One widely used scanning frame is PEST (Political, Economic, Social and Technological analysis) or the broader PESTEL (adding Environment and Legal).

We chose a simpler framework for our workshop based on the AQAL-Integral framework of Ken Wilber (2001, 832). Wilber's model is complex, but we excerpted one, simple idea—his "four quadrants" (see Figure 7.1). Wilber proposes that phenomena can be usefully sorted into those relating to individual entities and those relating to collectives (the vertical axis); those phenomena which are sensible or "exterior"—able to be detected by the senses or instruments—and those which are inner or "interior"—only available to internal reflection (the horizontal axis). This idea itself has a lot of subtleties and nuance, but we stuck to a form that was easy to explain by simply pointing to the fields and disciplines depicted in the diagram below.

Four Quadrants in Our Workshop

Although museum exhibitors are very interdisciplinary as a community, we felt it was important to introduce the idea of a scanning frame in order to give them permission to gather information from a wider pool and talk about issues in their experience that may not be usual at work. In particular, these participants were science and technology exhibitors, so we suspected a general bias toward those fields. In our case, we had already provided the results of scanning through the issues cards, so we asked the participants to apply the scanning frame to the scenario. They were asked to look at which aspects were under- or over-represented in the scenario they had developed. If they had a scenario that was biased toward exterior, collective then they were asked to consider the perspectives of the other quadrants. A side result of this exercise was a recognition that different people tended to speak more

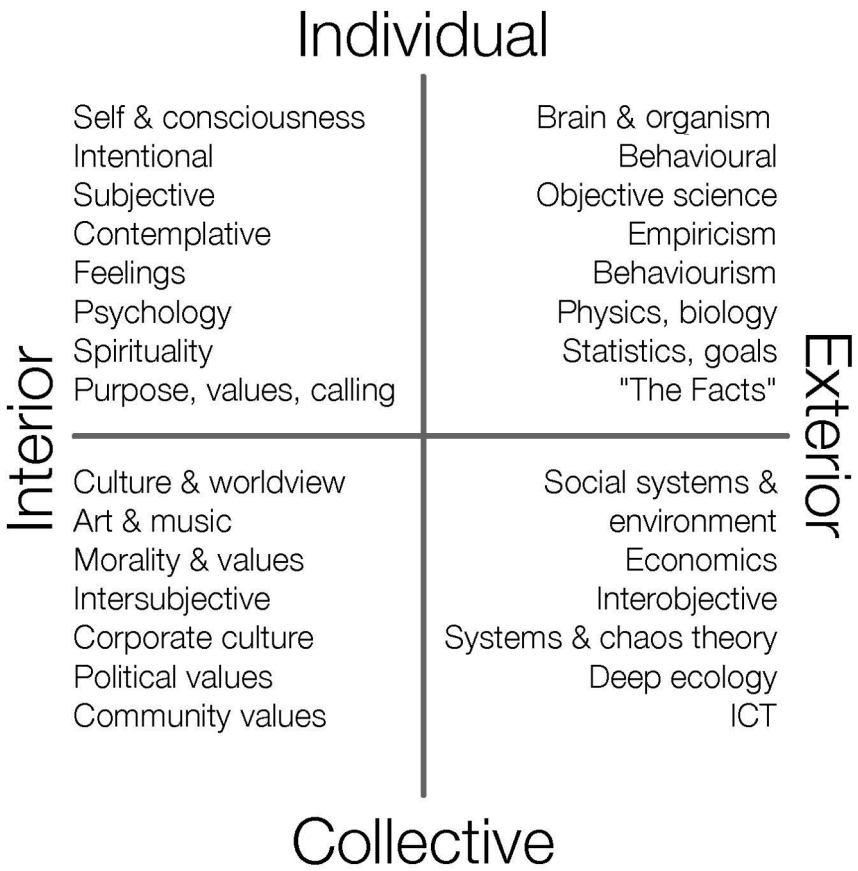


Figure 7.1 Wilber's four quadrants. Credit: Tim Mansfield.

from one quadrant, so people who had been quieter to this point often had more to say in this exercise.

EXHIBITING THE FUTURE

Finally, we gave each group a prospective audience and they generated an "exhibit" in the form of a story, song or mini-play that would appeal to the audience and communicate the scenario in the audience's language. This was tremendous fun and participants were extremely creative in their "exhibits." Exhibiting each different future, told in a frame to appeal to different audiences, showed both the complexity and potential of using Futures methods to generate alternatives and the ways in which they might be communicated.

DID IT WORK?

We had a few minutes at the end for participants to discuss how the techniques we shared might shift their practice. Our primary aim in this workshop design was to share our tools with these museum exhibitors to enable them to more effectively resist the demand for predictive, monological futures (Scenarios), to question deeper layers of discourse around emerging futures (Causal Layered Analysis) and to broaden their work beyond technology futures (Four Quadrants). Based on the intensity of participation, the quality of group work and the feedback, we succeeded in this aim.

From this encounter, it seems clear that our initial suspicions were well founded. Some of the commonly used tools in Futures do seem useful to museum professionals—and in more ways than we initially thought. In conversation with our participants, we also came to understand several dimensions of possible interaction between our disciplines and some ways to extend our initial encounter.

TRANSFORMATIONS

What might we have learned about the transformative potential of an encounter between Futures Studies and the museum profession?

Until the mid-twentieth century, the social role of the museum was broadly understood as being custodians of objective truths and societal treasures, and as agencies to communicate the static and concrete facts of the past.

As the world around museums experiences profound social, economic, technological and now geo-physical changes this perception of museums has become increasingly troubled and challenged. Like glaciers in the Antarctic, static truths about human history have begun to melt and become fluid under the critical attention of, for example, post-colonial studies, post-structuralism, race and gender studies.

A museum of natural history in 1914 could be expected to communicate the ever-increasing treasure chest of scientific knowledge issuing from the academy about the planet, its species and the universe in which it is embedded. In 2014, the pace of popular science reporting proceeds at a social-media pace and the political process around addressing climate change becomes increasingly heated, there is a demand for faster and more accurate public understanding of the complexities of these issues than was possible a century ago. The demand on museums is to give publics access to unsettled science where there is active debate and an understanding of consequential futures—what happens to us as a consequence of what we are doing now?

One interaction between Futures methods and museums is to enable museums to re-envision themselves and connect with the deeper social purposes of museums by rethinking fundamental metaphors. In our workshop, there were suggestions from the CLA exercise that museums might become

"arks" or "lifeboats" for artifacts of a society in decline as well as educational establishments. Others suggested that museums move from the metaphor of a "treasure house," filled with interesting things locked inside, to that of a "treasure map" where there is as much adventure to be had in the journey as in the arrival. The exploration of metaphors can provide alignment between strategy and everyday actions by connecting people to the higher purpose of an organization. That alignment is particularly important in a time of dynamic change like the one we are living through.

The climate change crisis demands that we find ways to expose and transform implicit discourses, habitual systems and unquestioned behaviors. Museums of the nineteenth and twentieth centuries showed us the past, some late-twentieth century museums began to reflect the near past and present—showing us ourselves as we may not have seen clearly. Perhaps the role for twenty-first century museums is to show the future possibilities from a present we see only dimly.

Divergent Exhibitions of Multiple Futures

Futures methods can bring a new way of thinking about exhibits in museums and how to communicate them using the ideas of alternative futures and layered temporality. Exhibition designers can use several Futures methods together to deepen understandings of future possibilities, reveal assumptions about the future, generate alternatives and inform communication strategies in creative ways.

The concept of alternative futures could inform a multi-threaded exhibit, allowing visitors to multiple paths of possibility from the present. Dramatically different future scenarios might form the basis for an exhibit, or create a greater sense of the space of possibility in the development of an exhibit. In our experience, trying to predictively imagine a single future history is much harder and more creatively restrictive than using several forecasts to construct and explore divergent visions. The role of an exhibition using these techniques might be enabling a kind of grounded imagination—and the capacity of action that results—more than the accurate communication of facts.

CLA offers multiple layers of analysis at which a picture of history can be known, critiqued and communicated—providing ways to make fact, system, discourse and myth distinct, but also have all four layers in the conversation without one layer shutting the others down—as positivism and post-structuralism are so prone to do to each other.

Wilber's Four Quadrants offer a sense of the disciplinary perspectives, which might combine to provide a more complete, integrated view of a situation or issue. His later work on methodological pluralism suggests that perspective—attending to the quadrant on which a discipline focuses, and whether the observer is inside or outside the object of study—allows us to understand when disciplines are using different perspectives on a common situation, or simply different approaches to the same perspective.

Both CLA (with causal layers) and Wilber (with quadrants and perspectives) keep discourses, understandings and temporalities distinct, but integrated—which allow more space, with less confusion. Futures methods like these can do two things for curators and designers: enrich and deepen the understanding of the topic, but also help to find ways to cross between disciplinary discourses and different layers of temporality.

We noted earlier that both Futures and museums share a concern with "Big Time"—spans of time longer than most people's everyday reality. Perhaps the simplest contribution of Futures methods to the museum profession is to provide ways to more effectively extend the capacity to engage with publics to communicate and discuss, not only past and present, but also possible futures.

CONCLUSION

Both Future Studies and museums communicate different narratives of time. After a short introduction to Futures ideas and techniques, our workshop participants were able to generate and deepen a number of alternative futures. They were also able to find new ways to communicate this information to an audience. Futures Studies offers museum exhibitors new thinking and communication tools as well as methods to inform strategy. These tools are already being using in a number of museums and related organizations and most of the techniques are straightforward and accessible for museums to incorporate into their existing practice.

Understanding and talking about climate change requires us to comprehend multiple ways of understanding time, to integrate knowledge from multiple disciplines and to comprehend possible, high impact but uncertain futures that are consequences of past and present action. Few of us are adequately equipped for the job, yet we must develop these skills in order to respond adequately to this emergency.

The combination of the methods of Futures Studies and of the museum professions with the emerging new public roles of museums in the twenty-first century provide publics with exactly these opportunities, perhaps just in time.

NOTES

1. Quoted in (Hines and Bishop 2006).
2. http://museumsassociation.org/home

REFERENCES

American Alliance of Museums. 2014. "Center for the Future of Museums." www.aam-us.org/resources/center-for-the-future-of-museums

Bell, Wendell. 2005. *Foundations of Futures Studies I: History, Purposes, Knowledge*. New Brunswick, NJ: Transaction Publishers.

Bennett, Tony. 1995. *The Birth of the Museum: History, Theory, Politics*. London: Routledge.

Bleecker, Julian. 2009. *Design Fiction—A Short Essay on Design, Science, Fact and Fiction*. Los Angeles, CA: Near Future Laboratory. http://nearfuturelaboratory.com/2009/03/17/design-fiction-a-short-essay-on-design-science-fact-and-fiction

Brier, D. J. 2005. "Marking the Future: A Review of Time Horizons," *Futures* 37: 833–848.

Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses," *Critical Inquiry* 35: 197–222.

Dator, Jim. 2009. "Alternative Futures at the Manoa School." *Journal of Futures Studies* 14(2): 1–18. www.jfs.tku.edu.tw/14-2/A01.pdf

Design Museum, London. 2013. "United Micro Kingdoms." www.unitedmicrokingdoms.org/exhibition/

Deutsche Post DHL. 2012. "Five Different Scenarios of Life in the Year 2050." www.dpdhl.com/en/logistics_around_us/future_studies/delivering_tomorrow_logistics_2050.html

Deutsches Museum. 2014. "Anthropocene—Nature and Technology in the Age of Humans." www.deutsches-museum.de/en/exhibitions/special-exhibitions/2014/anthropocene/

Elgin, Duane. 2005. "The Challenge of Planetary Civilisation." In *The Knowledge Base of Futures Studies: Professional Edition,* edited by R. Slaughter, CD-ROM, Vol 3. Part 3. Brisbane, Australia: Foresight International.

European Foresight Platform. 2014. "European Foresight Platform." www.foresight-platform.eu/

Falk, R. 2005. "The Changing Role of Global Civil Society." In *Global Civil Society: Contested Futures,* edited by Gideon Baker and David Chandler, 69–84. New York: Routledge.

Gunderson, Lance and C. S. Holling. 2002. *Panarchy: Understanding Transformations in Human and Natural Systems* Washington, DC: Island Press.

Hines, Andy and Peter Bishop. 2006. *Thinking about the Future—Guidelines for Strategic Foresight*. Washington, DC: Social Technologies.

King's College, London. 2014. "Humanitarian Futures Programme." www.humanitarianfutures.org

Inayatullah, Sohail. 1998. "Causal Layered Analysis: Post-Structuralism as Method." *Futures* 30(8): 815–829.

Inayatullah, Sohail. 2005. *Questioning the Future: Methods and Tools for Organizational and Societal Transformation*. Taipei, Taiwan: Tamkang University Press.

Inayatullah, Sohail. 2008. "Six Pillars: Futures Thinking for Transforming." *Foresight* 10(1): 4–21.

Lakoff, George and Mark Johnson. 1980. *Metaphors We Live By.* Chicago, IL: University of Chicago Press.

New York Public Library. 2011. "NYPL at 100, Six Questions for Jane McGonigal." http://exhibitions.nypl.org/100/digital_fun/jane_mcgonigal

McGonigal, J. 2012. *Gaming the Future of Museums*. American Alliance of Museums. http://youtu.be/zJ9j7kIZuoQ

Metropolitan Museum of Art. 2012. "Murder at the Met." http://metmystery.toursphere.com/pages/

Microsoft Corporation. 2012. "Future Vision." www.microsoft.com/office/vision/

Molitor, Graham. 2010. "Timeline 22-Step Model for Tracking and Forecasting Public Policy Change." *Journal of Futures Studies* 14(3): 1–12.

Museum3. 2014. "Museum3: What Will the Museum of the Future Be Like?" http://museum3.net/page/about-1

Pavlus. 2011. "Supeflux: Song of the Machine." http://vimeo.com/22616192

Raford, Noah. 2012. "From Design Fiction to Experiential Futures." In *The Future of Futures,* edited by Andrew Curry. Association of Professional Futurists. eBook, Vol. *Future* Chapter 4. http://thefutureoffutures.com/

AuQ14

Ramos, José. 2010. "Alternative Futures of Globalisation: A Socio-Ecological Study of the World Social Forum Process." Ph.D. dissertation, Queensland University of Technology, Brisbane. http://eprints.qut.edu.au/40986/1/Jose_Ramos_Thesis.pdf

Robinson, William. 2004. *A Theory of Global Capitalism: Production, Class, and State in a Transnational World.* Baltimore, MD: John Hopkins University Press.

Schwartz, Peter. 1991. *The Art of the Long View.* New York: Currency Doubleday.

SFMOMA. 2012. "Super Going." http://supergoing.com/sfmoma. Partial archive: http://web.archive.org/web/20120306121236/http://supergoing.com/sfmoma

Steel, Patrick. 2012. "Museums 2020: What is the Future?" http://museumsassociation.org/news/31012012-museums2020-what-is-the-future-for-museums

Suddendorf, Thomas and Michael C. Corballis. 2007. "The Evolution of Foresight: What Is Mental Time Travel, and Is It Unique to Humans?" *Behavioral and Brain Sciences* 30(3): 299–313.

Tellus Institute. 2014. "Tellus Institute—For a Great Transition." http://www.tellus.org/

Thompson, Evan. 2007. *Mind in Life.* Cambridge, MA: Harvard University Press.

Wack, Pierre. 1985a. "Scenarios, Shooting the Rapids." *Harvard Business Review* Nov.–Dec. (1985): 131–142.

Wack, Pierre. 1985b. "Scenarios, Uncharted Waters Ahead." *Harvard Business Review* Sep.–Oct. (1985): 73–90.

Wilber, Ken. 2001. *Sex, Ecology, Spirituality: The Spirit of Evolution,* 2nd ed. Boston: Shambhala.

Voros, Joseph. 2007. "On the Philosophical Foundations of Futures Research." In *Knowing Tomorrow? How Science Deals with the Future,* edited by Patrick van der Duin, 69–86. Delft, Netherlands: Eburon Academic Publishers.

Programming Interlude I
Curating Fire

Christine Hansen

The fresh green lawn sprouting at the edges of the shiny mass was an odd contradiction. Radiant heat from the fire had liquefied an object made of alloyed metal and the hardened lump still lay where it had melted, the burnt gardens it flowed through now transformed into an ash-stinking swamp by the fickle Victorian weather. Exactly what it had been nobody quite knew. Perhaps the lawnmower, maybe a bicycle, could have been the spare wheel of the car. Whatever it was, the blob laying in the damp grass was a grizzly souvenir of the 2009 Black Saturday fires. But at least the house was still standing. Further along the road, someone had photographed an array of oddments scavenged from the ruins of their home. The most striking was a pottery head made by the teenaged son of the family. The glazed face had melted in the flames and re-set with new features; somewhere in the fire storm, pieces of broken glass had spookily settled in the previously empty ceramic eye-sockets. The monster acquired new eyeballs, while the house succumbed to the flames.

These objects flicked through my peripheral vision, along with the oxidized sheet metal, liquefied glass, collapsed roofing and other burnt detritus, as I traveled through the Yarra Valley in April 2009, just eight weeks after the devastating fires. Our team of historians, under the auspices of the National Museum of Australia's Centre for Historical Research, joined the phalanx of fire scientists, social anthropologists, architects, forensic police investigators, urban planners and trauma psychologists that had flooded into the fire zone, to work with a community on what would become the book, *Living with Fire: People, Nature and History in Steels Creek* (Hansen and Griffiths 2012).

The experience of being in a recently burnt landscape is overwhelming; the endless horizon of blackened bush, entire streets of collapsed houses, every space infused with the stomach-churning stench of burnt stuff—all of it a background to the funerals and forensic searches, the trauma counseling and overworked burn units. Even as I was sinking into the horror of this place I had once called home, I was prickled by the question "How can we warn the future?"

Figure I.1 Burnt trees. Photo: Christine Hansen, 2009.

At first glance, the museum seems a likely place in which to take up this discussion, and certainly our major institutions in Australia all give gallery space to the story of fire.[1] But as I began to imagine how that discussion might evolve, I began also to wonder what could be added to existing collections from the 2009 fire disaster—and observed what museums were, in fact, collecting.[2] As this material began to find its way into exhibitions and onto websites, it occurred to me that our instincts as curators, to tell stories through and about objects, could be leading us in the wrong direction.

It was long-term exposure to burnt detritus that triggered my suspicions that a rethink of museum method might be needed. In the weeks and months that I camped in the fire-ruined landscape doing field research, my eye adapted to the diminished palette. Acres of burnt colourbond cladding oxidized where it lay, fading from iridescent blue to flamboyant orange to dun-colored rust as the weather worked its blistered skin. Paddocks of flipped car bodies moved through the same tones, as did twisted steel house-framing, burnt-out tractors, frayed and collapsed cyclone fences, tangles of electrical wire. Black, grey, orange. Repeat. The monotonous visual diet was broken by the first hopeful hairs of luminous growth springing sideways out of black stumps, but before green came to dominate the landscape once again, the relentless wasteland of rusting metal helped me to understand a fundamental reality: fire is merely an exchange of energy, the rapid oxidation of material in a chemical process of combustion. And in this process it reduces not just the color palette but also the diversity of textures. What remains after fire is simple: glass, metal, clay, concrete, rock. Occasionally bone. Textiles, wood, paper, leather, vegetable matter, hair, flesh; any

Figure I.2 Burnt house. Photo: Erin-Marie O'Neil, February 10, 2009.

combustible substance is vulnerable to obliteration—which is most of our material world.

If the material story of fire is limited, then so are the artifacts which make their way into museum stores. Destroyed objects with a significant social history will always find a place in collections: the lump of glass held by the National Museum of Australia, the melted lens of a historic telescope—once the cutting edge of science technology—from the Mt. Stromlo observatory lost in the Canberra bushfires of 2003, being an example. These objects have a history not entirely related to their transformation by fire, although their final narrative is nevertheless one of loss. But the other end of fire collections, the objects without a significant social history but which tell the story of what happens to material under pressure and extreme heat, are quickly becoming clichéd. Kitchen utensils fused into a an unusable mass, a lawnmower (or bicycle or car wheel) remade as a pool of molten metal, a car windscreen melted into a cascade of hardened dripping glass: the things of our lives dissolved and reformed in the monstrous kiln of a firestorm. What we are collecting is not the material evidence of a chemical phenomenon, but of our horror.

Understandably, after an event of such devastating loss as Black Saturday, trauma becomes the story, and our gasp of disbelief at the scale of destruction finds form in these remains. The objects of fire chill the skin and sicken the stomach as our bodies (before our minds) imagine flame against flesh. Radiant heat that melts metal would vaporize us from outside in. That our bodies recoil from these objects in an affective response is beyond our control, a necessary part of understanding and transmitting danger.

Figure I.3 Burnt tractor. Photo: Christine Hansen, 2009

But the affective resonance of the objects can lead to uncritical curatorship when it captures the narrative. It is not that destruction and trauma aren't important stories, but they are responsive and therefore passive. After the fact, we collect. After the flames, we understand. And our curatorial instinct for objects as vectors for stories leads us to the fields of flames over and over. This passivity holds an unconscious denial and reproduces it inadvertently. Somehow we are still shocked by the destruction that our collections of melted things reveals.

The coming climate is demanding we move out of the passive and into the engaged. If we are to survive, we need to think hard and fast about how to adapt. We need museums to lead a new public pedagogy of fire, and to do that we curators must resist our own affective fascination with destruction.

NOTES

1. The *Forest Gallery* at Melbourne Museum and the *Old New Land Gallery* at the National Museum of Australia for example.
2. See, for example, *Victorian Bushfire Collection* at Melbourne Museum, http://museumvictoria.com.au/about/mv-news/2010/victorian-bushfire-collection/

REFERENCE

Hansen, Christine and Tom Griffiths. 2012. *Living with Fire: People, Nature and History in Steels Creek*. Collingwood: CSIRO Publishing

Programming Interlude II Pacific Museums and Climate Change

Sharing Our Stories through Regional Workshops and Exhibitions

Tarisi Vunidilo

Climate change is a natural phenomenon that affects every community in the world. It is a topic that is widely discussed within top-level politics right down to community level and through nongovernmental organizations. One such organization is the Pacific Island Museum Association (PIMA). PIMA is strongly aware that climate change affects indigenous communities in the Pacific and therefore has taken practical steps to lead in facilitating discussions on the subject with Pacific youths, as well as supporting individual Pacific museums to proactively engage in promoting climate change as a community topic of discussion and action. This interlude aims to highlight three (3) case studies that PIMA was involved in, in relation to the topic of climate change. The first one is the Pacific Heritage and Youth workshop that took place in Honiara, Solomon Islands in 2012 during the 11th Festival of Pacific Arts (FOPA). The second project involved the National Museum of Samoa's collaboration with the American Museum of Natural History in New York. The third and most recent project was PIMA's involvement in the Melanesian symposium, which was part of the 5th Melanesian Festival of Arts (MAF) in Port Moresby. This symposium had a session on "Climate Change and its Effects on Art and Culture" and included how the Solomon Island National Museum (SINM) was involved in research and information dissemination.

One way that PIMA successfully utilizes its networks is by conducting awareness workshops during regional events. In 2012, PIMA joined forces with its sister organization ICOMOS Pasifika and UNESCO (Samoa Office) and the SINM to deliver a three-day workshop on the key topic "Youth and Climate Change" at the 11th Festival of Pacific Arts in Honiara on July 2012. The workshop was planned around bringing cultural, environmental and sustainable development together with youth issues. It was also designed to be an opportunity for the youth of the region to voice their opinions on issues related to the safeguarding of Pacific heritage, both cultural and natural, for sustainable development, as the festival's theme was "Culture in Harmony with Nature." All workshop activities either built on or complimented this goal. One of the substantive outcomes of this workshop

was an action plan to safeguard Pacific heritage designed by the participants, which will be used to promote the youth voice in sustainable development initiatives throughout the region.

Another effective way that PIMA raises the awareness of climate change is through Pacific museums international exhibition collaborations. Palemia Ugapo reported that in 2013, the Museum of Samoa collaborated with the American Museum of Natural History in New York on the environmental theme "Rethinking Home: Rethinking Climate, Linking Samoa and New York." In this project, communities in Samoa and New York City affected by natural disasters, including Hurricane Sandy and Cyclone Evan, worked together to share and learn from their experiences of climate change. Each museum selected a group of ten participants who were sharing and recording their stories through a series of workshops. In New York, this group included adults and students from Brooklyn, Queens, and Staten Island who were impacted by Hurricane Sandy in October 2012. The museums brought together coastal communities from both locations to conduct workshops, meetings, and site visits that explored how concepts of home had been altered by climate change (Ugapo 2013). The goal of the project was to strengthen cross-cultural ties and help people from different backgrounds address the impacts of a common problem—climate change. This joint venture between the American Museum of Natural History and the Museum of Samoa is a good example of respect and appreciation binding different cultures, as the global effects of climate change continue to threaten Pacific communities and for Samoa, the risk of losing their maritime culture too (Ibid).

Similar to the first case study, PIMA was part of the 5th Melanesian[1] Festival of Arts, hosted by Papua New Guinea from July 7–9, 2014. The University of Goroka organized a Melanesian Symposium titled "Cultural Diversity and Nationalism." Within the symposium program was a session titled "Climate Change and its Effects on Art and Culture." Mr. Tony Heorake presented a paper on the effect of climate change in the Pacific focusing on artificial islands of Melanesia. His paper provided a historical snapshot of how artificial islands were created in the Lau Islands of Malaita, and other places in Papua New Guinea, Vanuatu and Fiji. The work by the Director of the Solomon Islands National Museum is significant as it puts the museum at the forefront of scientific research, which is also embedded with history and oral traditions.

We hope that many more Pacific museums will take the opportunity to actively share their stories through museum exhibitions and community outreach programs. Regional events such as the FOPA and the MAF have been successful platforms of reaching out to communities. PIMA believes in collaboration and working together with other regional organizations in the Pacific, and also with museums around the world. Museums and cultural centers play a very important role in our communities. Going forward, the best way to utilize our museum buildings and resources is to create spaces

Figure II.1 Workshop banner put together by a group of young Solomon Island artists. Photo: Alison Fleming, 2014.

that allow us to work alongside youths and older people and to share our indigenous knowledge for the benefit of our people today and for our future generations, in particular in advocating the message of valuing our indigenous cultural knowledge for climate change adaptation.

NOTE

1. Melanesian countries that are part of the Festival are Fiji, New Caledonia, Papua New Guinea, Solomon Islands, Torres Strait Islands, Vanuatu, West Papua and Timor Leste.

REFERENCE

Ugapo, Palemo. 2013. "Workshop Linking Residents of New York and Samoa Held This Week as Part of the Rethinking Home Project." *The Savali News*, November 20. www.savalinews.com/2013/11/20/workshop-linking-residents-of-new-york-and-samoa-held-this-week-as-part-of-the-rethinking-home-project/

8 Beyond Confrontation

The Trialogue Strategy for Mediating Climate Change

Bob Hodge

This chapter looks at a dilemma for this book, which engages with possible roles and strategies for the museum and science sectors committed to tackling the challenges of climate change. Climate change is so important that that importance may get in the way of the best efforts of committed institutions to do their bit for this cause. The dilemma arises from what Hulme (2009) has called its status as a "wicked problem" (Rittel and Webber 1973). "Wicked problems" involve a complexity so great that the terms of the problem and the nature of possible solutions, in science and policy alike, cannot be determined. Normal strategies of communication break down in this situation. They are ineffective or counterproductive.

This chapter shows why communication strategies traditionally used by science and museums are intrinsically inadequate, especially when faced with the hyper-complex theme of climate change. It argues that the two main responses of mainstream climate change communicators, to remain serenely above all controversy or get down and dirty in unending battles, will both be futile and unproductive. It urges, instead, that in order to be managed, intrinsic complexity and uncertainty must first be embraced. It argues for a strategy that can navigate irreducible complexities to achieve a series of partial, provisional solutions across the museum sector. As Hulme states, a single definitive solution is not available. Far better for museums would be many small outcomes, many individual programs, each worthwhile in its own right. The strategy I introduce for this purpose is built around the principle of trialogues.

COMMUNICATION MODELS: FROM SILVER BULLETS TO SOLAR SYSTEMS

The dominant communication model for both science and the museum sector has been described as the (magic) bullet model (see Hodge 2011) because it represents communication as a linear process in which messages are targeted like bullets at audiences, understood as passive targets who will respond in predicted ways once they are "hit." But this model has a strange status. In

communication theory it has long been discredited (Berger 1995), because actual audiences are always less predictable than this model envisages, and campaigns usually want to change behaviors, requiring active engagement by the "targets." The "new museums" movement is built around complex models of communication and modern media forms (Hooper-Greenhill 1999). Yet in practice, communication by both scientific institutions and the museum sector is still dominated by linear "bullet-theory" models. This model is likely to be even less adequate to communicate "wicked problems" and engage with complex publics on behalf of change.

In science communication the two models have been called the "deficit" and "interpretative," respectively (Locke 1999). The deficit model envisages one-way communication from experts, full of knowledge, to non-experts, empty vessels waiting to be filled. One condition for this operation to occur smoothly is for experts to conceal all traces of disagreement or dissent among their ranks. Against this model, some writers on science communication argue for open communication in which scientists appear "with warts and all" (Collins and Pinch 1993).

The deficit model of communication also has a reductive, binary model of modes of communication, opposing verbal language in print form to all other modes, seeing all other modes as distorting the rationality of the argument. But communication theory recently has recognized the importance of multi-modality (Kress 2010). New technologies have incorporated multi-media forms in most messages, and multi-modal theorists insist that multi-modality has been present to some degree in all modes and media. Traditional museums communicated by two main modes, verbal language (in labels and captions) and through collections as forms of communication (Pearce 1999), through artifacts and photographs. "Modern" museums employ new technologies as a third mode, but they still use all three modes, in different configurations.

From communication theory an important alternative model was developed by Russian Mikhail Bakhtin (1996). Bakhtin contrasted "monologic" discourse with different degrees of dialogue. Monologic discourse emanates from above, imposed on those below. For Bakhtin in Stalinist Russia, this was the discourse and strategy of totalitarian rule in a command-and-control society. As is now agreed, that model was dysfunctional as well as unjust.

Museums and public bodies are not totalitarian organizations, and should be wary of the dysfunctional tendencies of monologic communication. The price that has to be paid for the deficit model is the suppression of dialogue and debate amongst experts, to make communication from experts to their publics one-way and non-interactive. Bakhtin's "dialogic imagination" in contrast, emphasizes open two-way interactive processes, in which participants change their positions through the exchange, potentially producing new knowledge. As Chou (2002) has argued, Bakhtin also envisaged the creative role of a third participant in a trialogue, more open and dynamic than a two-part dialogue.

The concept of trialogues is a valuable tool for examining science and museum communication about "wicked" problems. Here I will develop the concept by putting it in dialogic relationship with ideas from science. I begin with basic physics, Newton's famous laws of motion, applied to the bullet-image for communication (1995/1687). Law 3 states: "To every action there is always an equal and opposite reaction." In the event imagined as bullet-messages impacting on audiences, the outcome is equally determined by the audience as by the bullet, and the bullets themselves are affected by the encounter. Bullet-theory applied to communication is not good physics misapplied to sociology. It is bad physics before it becomes bad sociology.

My next dialogic use of physics comes from the work of nineteenth century French mathematician Henri Poincaré, whose ideas contributed to Einstein's achievement. Poincaré's analysis of the "three-body problem" is now regarded as foundational for modern chaos theory (1993). The "three-body problem," first posed by Newton himself as proposition 66 in Book 1 of the *Principia* (1995/1687) was a test case for the Newtonian paradigm: how could Newtonian math provide precise and certain predictions for all future relationships between the sun, the moon and the earth?

In 1889 the king of Sweden offered a prize for a correct solution. Poincaré was awarded the prize for showing why it could not be done (Diacin 1996). In the process he demonstrated the mathematics of "indeterminate chaos": that is, relatively simple systems, in this case of only three components, each the product of only two variables, gravity and momentum, cannot be predicted with certainty over a long term. It is important to stress that the three bodies in such a system must be acted on by opposing forces. Gravity alone would collapse all the bodies into a single mass. With momentum alone, bodies would fly in all directions. Relatively stable systems such as the solar system are produced by balancing two kinds of force.

For this purpose, three-body analysis is strategically positioned at the edge of chaos. Three bodies introduce a new stage of indeterminacy compared to two bodies, yet they seem the simplest form of the n-body problem which is the normal condition of reality. Poincaré did not provide a mathematical solution to the three-body problem. On the contrary, he only proved there was no such solution. What he produced instead was a qualitative model through which to represent and think about the inherent complexity of such systems, and understand their dynamics over shorter frames.

This theory is relevant for understanding and communicating climate change. For deficit model/bullet theory, uncertainty is a major problem, and is what makes "wicked problems" like climate change especially challenging. In its original sphere of application, the solar system, uncertainty is a product of the system, not an external problem. This uncertainty cannot be definitively fixed, but it can be analyzed and communicated, in many systems, large and small. In its terms, each element can be understood as affecting and affected by interactions with the other elements of the system, an instance of Newton's third law inserted into an endless series of iterations.

As scientists, Newton and Poincaré both sought scalar-invariant laws. The Newtonian synthesis deliberately brought together celestial and terrestrial mechanics under the same principles. But the discovery of quantum levels at very small scales opened up a potential gap in the Newtonian unity. The development of chaos theories that Poincaré contributed to opened up the idea of self-similar patterns, called fractals by Mandelbrot (1993), varying unpredictably from any common template across a multi-scalar reality. Strategic analyses of specific acts and pieces of communication around climate change would not expect interactions at any one scale or site to be the same.

In a second iteration of a dialogue between the scientific theories of Poincaré and the ideas of Bakhtin, I propose the following principles for analyzing science and museum communication:

1. Hyper-complex problems can be provisionally represented as three-body systems of interaction, and communicated by a matching trialogue strategy.
2. Each trialogue participant is understood to be positioned in terms of at least two axes, producing opposition and convergence.
3. Each trialogue should be studied over a number of iterations that will generate an unpredictable diversity of positions.
4. Each communication mode will be in a trialogic relationship with other main modes, to produce further complex outcomes of meaning.
5. The patterns of similarity and difference will operate as fractals over different scales of a multi-scalar reality, inflected by different sites and purposes.

COMMUNICATING SCIENCE

My main concern in this chapter is with communication in the museum sector in a trialogic model that includes analyzing communication by scientific institutions that are part of the communication landscape. I will use trialogic models to show how texts produced by public bodies are always the product of an n-body series of exchanges, which are usually partly recoverable, whose complexity can be sufficiently captured as reduced to three key participants. Such analysis can also be used proactively, to project a more systematic trialogic strategy that science institutions and the museum sector could develop and use as the basis for practical strategies for communication.

In this case I will analyze an especially representative text from the public domain. In 2010 the Australian Academy of Science (AAS) published a twenty-four-page online document, "The Science of Climate Change: Questions and Answers" (2010). As a citizen concerned about a well-informed debate about climate change, I admire much in this text and

intervention. The AAS is the peak body for science in Australia, here taking the risk of engaging in a wider debate because of their concern for the importance of these issues. They avoided technical language and published online, the most rapid and accessible media today. They appointed a working party of nine eminent scientists to prepare a set of seven "big" questions and answers, in a text with 176 references, most with many authors, representatives of an n-body scientific community. According to Professor Kurt Lambeck, then president of AAS, in his foreword, their aim was to "enhance public understanding of science" (AAS 2010, 2). This formulation implies the interpretive model of science communication, which recognizes the public already has some understanding to be enhanced.

Lambeck's introduction begins by emphasizing complexity, "at the intersection of the disciplines where uncertainty can and will arise," explaining how these issues disrupt the normal parameters of science:

> What makes climate change different is that the consequences are not only potentially global and serious but also that they occur over long time scales (decades to centuries) so that actions need to be contemplated before full understanding is achieved. (2010, 2)

Lambeck does not use the term "wicked problem" but he is indicating what makes this problem wicked. The aspects are not only complex and interdisciplinary, but they are urgent, and present problems of scale between human decisions and the much larger scales of science. This insightful analysis suggests that wicked problems are partly wicked because they include scale-variant phenomena over incommensurately different scales. Lambeck here treats his readers as highly educated and critical.

With all these merits there are still constraints on this document coming from an underlying deficit model. The format has the structure of a dialogue, with questions and answers, but not all dialogues are equally open. One common form, for instance, is known as "catechistic," from the form of catechisms in the Catholic Church, where the answers are strictly prescribed, exact answers learned and reproduced. Catechistic dialogues are a top-down strategy for control through dialogue. The AAS text has many catechistic qualities.

There are similar tendencies in the role of the experts. They are the immediate source of both questions and answers, so in effect this is a dialogue within this select community. These nine experts do not include representatives of other voices, either the public or science communicators. They are all elite scientists, all men. There are many ways this team could have been chosen to incorporate more diversity.

But as the document claims, most of these experts have been on the front lines of climate change debates, able to distill the range of questions they have handled on many occasions. In a trialogic analysis they are all scientists

modified by interactions in a many-body system, who have themselves affected the public debate. These nine scientists represent many iterations of this n-body communication.

This fact makes the text useful data for trialogue analysis. There is ample evidence of the effects of other voices on this text. For instance, the seven questions may not directly represent voices and interests of non-scientists, but they respond to concerns that are more prominent in the public arena than in scientific circles. Question 1 clarifies terms from a scientific perspective: "What is climate change?" but in Question 2, "How has Earth's climate changed in the *distant* past?" "distant" includes 1800, whereas geological time stretches back millions of years. Questions 3 to 6 deal with the issues of recent climate change and human responsibility, while question 7 asks directly about the uncertainty in the science.

These shifts show how in this text the scientific description of climate change has been distorted by a single issue that drives the debate, the question of human agency, in scientific terms "anthropogenic" change (AAS 2010, 2). The document responds to this discursive pressure by providing answers that support a strong position against "climate change deniers" who focus their attack on anthropogenic climate change. The outcome shows the truth of Newton's third law applied to the bullet-model: even eminent public communicators are affected by their targets, in a process that is made more explicit in a trialogue model.

FROM CONFRONTATION TO TRIALOGUE

There is a loosely organized group engaged in climate change debates often called "climate-change deniers" (CCDs) who represent a major challenge for museums and science bodies. I argue these difficulties are exacerbated by the dominant model for public communication, the bullet theory/deficit model. This model explicitly assumes a monopoly of knowledge, that senders of messages are all knowing and should be all-powerful. However, this model is shadowed by another model based on the consistent experience of its failure. In this shadow model the audience is active but misinformed, and communication is an undeclared war on them or their false advisors. The shadow model often has three participants, but the relationship is not interactive and hence, not trialogic.

The two options in the shadow bullet-model, to ignore proponents or attack them, seem opposite, but in important ways they are two parts of the same set of polemical binary responses. To ignore a position is to attempt to negate it, which is a form of attack. Here I discuss a specific case, to suggest how trialogue strategies could be used by museums in climate change-related exhibitions.

In 2009 an Australian climate-change denier, Cardinal George Pell, the most senior member of the Catholic Church in Australia, wrote a web page

directed to the Catholic faithful supporting the views of a scientific CCD, Professor Ian Plimer (2009) (my numbering).

Pell begins with a metaphor:

1. The tide on climate change is starting to turn.

He praises Plimer's book, *Heaven and Earth,* then states:

2. Plimer is not a climate-change denier, because history shows the planet is dynamic and the climate is always changing, sometimes drastically . . .
   Plimer demonstrates that a considerable amount of scientific evidence has been produced to counter the still-predominant view that human activity, especially through industry, has polluted the atmosphere with carbon dioxide, which will produce disastrous climate changes including a rise in temperature, a melting of the ice caps and rising sea levels. Contrary evidence is already changing the debate.

He finishes with an appeal to "facts":

3. What do we make of these facts? The carbon dioxide in the atmosphere continues to rise, but the world's temperature has not risen since 1998.
   In Roman times and in the Mediaeval Warming (900–1300 ad) temperatures were higher than today by 5 and 6 degrees Celsius. No industries then!

The AAS makes no mention of Pell, understandably given that Pell is not a scientist. Symptomatically it makes no mention of Plimer either, but Plimer is a scientist, a professor at Melbourne University, one of Australia's leading universities. In 1995 he won the Eureka Prize for dissemination of science, ironically a prize sponsored by the Australian Museum, one of the "Hot Science" partners. Some of Plimer's arguments are included in the AAS questions, a form of recognition, but his published work is not cited. So he is removed from the record but not entirely ignored.

A museum might ignore Pell's text, on the grounds that Pell is not a scientist. But Cardinal Pell is a significant public figure, the most senior figure in the Catholic hierarchy, arguably the most prominent religious figure in Australia today. This constructs a dilemma for museums in terms of the shadow bullet-model. If he is ignored, and his views are allowed to circulate uncontested, they may seem to have been endorsed. But if they are specifically contested, this gives them recognition. What are museum or science communicators to do?

I suggest that this dilemma is an artifact of a linear model of communication. This section offers materials for a trialogic strategy that could turn

this kind of text into an opportunity. The text has three components, which can be separated out to show complexities in his position. His opening statement (1) was prescient, written seven months before the disappointing Copenhagen climate change conference, COP 15, and acute problems confronting the Australian government over its climate change bill. Pell's science may not have been strong, but his political instinct was. This is a fact about climate change as a "wicked problem," and as such has a place in a climate change trialogue in a museum space.

Pell's comment (2) about Plimer as "not a climate-change denier" raises another issue. The long history of climate change is not in doubt. The AAS agrees. This is consensus science, and should be part of any climate change exhibition. The dynamism and scope of climate change is part of its status as "wicked problem."

This consensus focuses on the crucial issue in dispute, the existence and scope of human-induced climate change. In this polemical situation, where points of difference are emphasized, an either-or logic looms too large, for both parties. I have suggested the AAS skewed their document, and seemed too exclusively concerned with anthropogenic climate change. Pell and Plimer are skewed the other way. In a trialogue framework, this issue should be up for discussion, and the public trusted to find their own way through it. A survey by the "Hot Science" project found that more than 60% of Australian and American visitors had a high or very high interest in climate change, and 81% of Australians and 77% of Americans believed that future generations have the right to inherit a habitable world. These visitors do not occupy a deficit position in understanding climate change.

Moment (3) raises different issues. With (1) and (2) I argued that good scientists (AAS, or a museum) could agree with what is said and take it in different directions in a trialogic framework, but (3) contains four "facts," three of which are questionable or demonstrably wrong. This is the situation where the deficit-model seems irresistible to expert bodies like AAS or the museum sector. How can it be right not to confront such clear errors?

The first "fact" is agreed on all sides. CO2 is indeed increasing. The next "fact" is more problematic. AAS specifically addresses it, as a misinterpretation of the implications of what was an agreed fact in 2009, that the number of hottest days per annum spiked in 1998. The AAS response drew attention to the broader statistical picture, in which there are wide annual fluctuations, but a consistent increase in the average-per-decade since 1960, with 2001–2010 by a long way the highest of this set. Ironically 2009, the year Pell was writing, was higher than 1998, and 2010 even higher.

A technical argument about statistics may not persuade many, since the answer requires high levels of statistical literacy to be appreciated. In a trialogue in which a key participant is a member of the public, insisting on this might score a point, but lose the audience. But this problem could be turned around. This variability could be made focal. It is as much a fact as the 1998 peak, which the AAS graph shows dramatically. The decade from

1991–1999 had the highest peak since 1960, and also the lowest in that period, in 1999, yet it still finished up on average higher than any previous decade. The combination of wide fluctuations around a more slowly increasing average is a more complex picture, which is invited by Pell's intervention.

Pell's final factoid concerns the Mediaeval Warming. Pell gives no references for his figure of 6 degrees Celsius warmer than today. In this debate, 6 degrees is a huge difference. AAS recognizes a Mediaeval Warming (AAS 2010, 6) but claims that the Northern Hemisphere in the past fifty years has been warmer than the Mediaeval Warming, and even warmer in the past decade, though they note that there is sparse data for this period, especially from the Southern Hemisphere. On this matter, it is hard to see that Pell is not simply factually wrong. In a later discussion on this point (Pell 2011) he seems to agree with the figure proposed by archaeologist Brian Fagan of between 0.7 and 1 degree Celsius higher than recent temperatures. This is in the same ball park as the AAS. Did a decimal point slip at some stage in his writing process?

Yet even with so egregious an error, supposing it is one, it is not clear what opponents should do about it. Should a laser-directed scientific bullet be sent to destroy the error? In a trialogue that includes ordinary citizens, they may have sympathy for someone who makes such a slip, especially if the main point still stands. There was a "mediaeval warming" in Europe, and it could not have been caused by industrialism. The important point about climate change as a "wicked problem" is that it has many causes and many effects, many of them not well known or well understood. It is not a linear process in which only industry-produced CO2 causes global warming and all its effects. Complexity and uncertainty must be major messages to enhance public understanding of climate change and capacity to respond creatively and responsibly. Pell could be used to trigger that message.

I have argued that Pell could be included in a museum exhibition on climate change using a trialogue strategy. Here I outline some suggestions. Instead of trying to silence Pell, a trialogue strategy might make him talk more. For instance we could ask why he chose to enter this debate. He answered that question on a later web page in a speech to the "global warming" group in London on October 26, 2011:

> At a recent meeting of the priests' council in Sydney one parish priest asked me why I was commenting publically on the role of carbon dioxide in the climate, because in the past the Church had made a fool of herself on a number of occasions.
>
> I replied that I was well aware of at least some of these instances, and that one reason I was speaking out was to avoid having too many Christian leaders repeating these mistakes, and to provide some balance to ecclesiastical offerings.

Pell discussed the most famous instance, where his own Church rejected Galileo's views as heresies. For most people today this seems good reason for Pell and the Catholic Church to keep out of the climate change debate. But Pell reframes this episode and draws a contrary lesson. Galileo was a heretical scientist at the time, and Pell casts Plimer as his modern counterpart. Pell compensates for the Church's error of the past, as he sees it, by heroically defending this modern Galileo against orthodox science. This perspective may not convince everyone, but it is a provocative, original talkingpoint.

Using this kind of material I envisage an Australian trialogically framed exhibit focused on Pell, bringing out complexities in this voice on climate change, including contradictions within as well as between religion and science. Museums can provide a place for interactions. In my imagined exhibit, Pell's voice would be represented fairly, in print texts and videos, including his face and voice. In the trialogue spirit he could be asked to make his own comment on the display, and visitors could choose to hear him; a scientist and museum staff would speak about this display: a trialogue between three separate perspectives, available at the press of a button.

TRIALOGIC RESEARCH ON MUSEUMS AND CLIMATE CHANGE

In our research in the "Hot Science" project we wanted to provide data and analysis to help our museum partners be more effective in informing and empowering their publics around the theme of climate change. To this end we used trialogic principles to look at how museums communicate with their publics about their mission, and what they imply about their underlying models. Here is the Australian Museum (AM) website on climate change:

1. In its role as a leading scientific institution, the AM recognizes that climate change poses a serious environmental, economic and social threat to our current way of life and to the security of future generations around the globe . . .
2. What can we do about climate change? AM scientists are making significant contributions to the science that will help improve models for predicting further climate change . . .
3. How can we minimize the effects on climate change caused by our current way of life? The three R's are a good way to start: Reduce, Repair and Recycle.

These three sentences form part of the same text from the same institution but they imply different roles for AM. In (1) AM aligns itself so closely to science that all differences disappear. With such total convergence there is no scope for dialogue. In (2) "we" seems to refer to AM, whose scientists

are distinct from mainstream science but subordinate, with no mention of other expertise they have that could contribute to non-science dimensions of this "wicked problem." "We" in (3) has a different referent in a different interaction. It could be interpreted inclusively, AM sharing guilt and responsibility, but at this point it seems mainly a didactic "we," treating the public as primary school children, delinquent causes of "our" current way of life.

These different positions all reflect the deficit model. AM removes differences with science in order to simplify the message and gain greater authority. It then uses this authority to adopt a superior position in relation to the public. All its messages are admirable, but they could be more effective embedded in a more trialogic framework, more independent from science, more dialogically related to the public.

Trialogue principles also guided our research. We conducted and videoed a three-hour trialogue at each of our partner institutions (Australian Museum, Melbourne Museum, Liberty Science Centre, Powerhouse Museum, Questacon). Each trialogue was a series of relatively self-contained discussions, focused around an exhibit or following a theme it generated. The three bodies we proposed for a minimally complex trialogic interaction around climate change were Science, Museums and Communication, each represented by a single exemplary individual. For science, these were Professor David Karoly, Federation Professorial fellow located at Melbourne University, a lead author of IPCG reports and member of the AAS climate change Working Party; and Emerita Professor Jann Conroy, Associate Director of the Hawkesbury Institute for the Environment at the University of Western Sydney. Each partner institute provided a senior member of staff. I was involved at all sites. Dr. Juan Salazar and Sally Leggo edited around twelve hours of video footage down to seven separate videos, each of around seven to ten minutes. Each video had elements from three or four sites, always including both a museum and a science center. In this way they were fractals of the sector as a whole.

I illustrate one use of this data with an excerpt from a trialogue at the Liberty Science Center, involving David Karoly and its Vice President, Exhibits and Programs, Wayne LaBar:

DAVID: One of the things about this project I found interesting is, how we explore, with museums, the level of engagement with the community . . . the greater level of engagement, but without undermining that sense of independence and trust that has been built up over probably the last 100 years.

WAYNE: We should certainly be a source of conversations, and people gathering, and information sharing, and we have to figure out how.

DAVID: I guess my view at the moment is that much of that engagement in the past has been for the community to come to the museum and take away information, not so much . . .

WAYNE: We have been traditionally pushing information to the unwashed, OK, in a way the masses, you know . . .
DAVID: Partly washed . . . (Laughter)
WAYNE: Partly washed, depending on the day of the week! . . .
WAYNE: People are generating their own content, they are as much empowered to generate the information, it's much more of a dialog between them, and we just provide the facility to allow that dialog to occur. ("Hot Science" project transcripts)

In this exchange David Karoly, a distinguished scientist, takes on the role of advocate for museums and a critic of traditional models of communication. This mobility of position is the product of many iterations of the trialogue during the research and before. Wayne LaBar, a leader in innovative forms of museum display, begins with a tentative form of ideally participative communication, but is triggered by the trialogue conditions into presenting an opposite ideology, a caricature of the traditional model. This is a joke, which both share, but it also includes in the trialogue the voice of the traditional museum and the traditional model of communication in science and museums. In practice and not just in jokes, the traditional model survives in modern museums, as the AM website shows. Like the inconvenient presence of CCD advocates, this voice needs to be listened to and incorporated, not just combated or ignored. Museums, like science, will be more effective communicators if they accept and include their own diversity and ongoing dialogues in their trialogue processes

TRIALOGUES AND MUSEUM PROGRAMMING

The "Hot Science" project also aimed to contribute to more creative and effective programming around climate change for the Museum sector. Our trialogues played a role in this process. I illustrate with some excerpts from a trialogue with Janet Carding, then Assistant Director at the Australian Museum (AM), since 2010 Director of the Royal Museum, Ontario, Canada. The other members of the trialogue were Professor Jann Conroy and myself. As in all the trialogues, the reference point was the Museum and its displays, and the focal voice was that of the museum representative, analyzed as inflected by the other two, each already affected by the others.

Janet was readily made conscious of a number of relevant trialogic structures in the context. When Jann, a plant scientist, asked where the plants were, Janet replied, "the Botanic Gardens is right next door to the Australian Museum, so historically we've always looked at the fauna and the Botanic Gardens have always looked at the flora of Australia." But she added that "when it comes to matters like climate change . . . we use that as

an opportunity to go out and make contacts with experts in the field." This suggests she regards past forms of museum as having higher boundaries, and less scope for being dialogic or trialogic. Themes like climate change create pressure toward a different model for the museum.

Jann pushed her further: "So what sort of links do you have with the Sydney Aquarium?" Janet first responded: "Well, here at the Museum we have a lot of fish scientists," but then added: "At the same time the Aquarium is a competitor of the Museum, because many of our overseas visitors will choose to go to one organization, and they'll go here or they'll go there." She uses a trialogic structure as a potential framework, in which relations are constituted by both links and oppositions, where three bodies have more options if they cooperate as well as compete. Trialogues make strategic sense to Janet as an experienced museum administrator.

At this time, AM was planning a dedicated exhibition on climate change, but our trialogue focused on existing exhibits to see how far they already did or could deal with the theme. In this way the trialogue could feed into two alternative strategies for mediating climate change. It identified elements that could be adapted for inclusion in a dedicated climate change exhibition. At the same time it showed how this theme could be embedded in many exhibits, making climate change an opportunity for many activities.

There were many complications of the anthropogenic theme. For instance, one exhibit, "Where Are They Now?" showed casualties of habitat loss. I asked Janet how she might overlay a climate change message on this exhibit. She replied:

> Well, when I speak with our scientists about this, as they tell me, climate change makes habitat loss worse and makes biodiversity loss increase, but actually if there wasn't a climate change issue there would still be major issues. . . . But yes, when you're in a situation where you've already got less than one per cent of your grasslands, there's not much more that climate change can do, to be honest!

These good scientists do not deny climate change. But they are in tune with Hulme's advice, to follow different agendas important in their own right that connect obliquely to climate change.

An exhibit on "Adaptation" raised similar issues. I asked how a climate change message would fit in with the exhibit's theme of survival. Janet replied:

> OK. I can see from the perspective of climate change it being a worry, that it might be seen as the wrong message, but our scientists are very clear about this, and we had long discussions about it. Our scientists were saying that we need to be really careful about portraying a struggle

> for survival with animals that are actually very well adapted to living in what we consider to be extreme circumstances . . . and so they saw it as a positive message.

Janet is reporting a dialogue between scientists and curatorial staff in which the scientists prevailed. The resulting positive message can weave into the complex mix of messages relevant to climate change, contributing a positivity the climate change argument needs but not at the cost of good science. The dialogue she recovers enhanced AM's communication and could have been made public.

Janet focused on one exhibit specifically on "climate change," because she felt it illustrated many points that the planned dedicated exhibition on climate change could develop. It was a small exhibit with two main features. One was a real stromatolite in a tank of water. She commented:

> Stromatolites, I think, are extraordinary, because they played a huge role both in affecting the climate of the earth in that they are an ancient form of bacteria which is now thought to have been largely responsible for removing a great deal of the highly oxygenated atmosphere that we now enjoy. . . . Also, they are the oldest living life form that we have direct evidence of.

AM in this case broke with the mode constraints of traditional museums by communicating through an object that was alive and aquatic, belonging to the Sydney Aquarium according to the distribution of roles Janet had explained to us.

The message she foregrounds concerns climate change, but not anthropogenic climate change. On the contrary the stromatolite is a humble hero of a very ancient change in climate that made subsequent life possible. The cyanobacteria that compose it removed high levels of carbon dioxide and generated the oxygen rich atmosphere that complex life forms needed to develop as they did.

This process played a significant role in James Lovelock's provocative proposal of Gaia (2000), the idea that life—especially small, simple forms like bacteria—has played a crucial role in maintaining optimum conditions for itself, including a balance between oxygen and carbon dioxide. Lovelock has controversially applied his ideas to current climate change (2009) provoking a debate as to whether the self-sustaining mechanisms of the Gaia system may again cut in to save the planet (though not necessarily the human race) or whether the current anthropogenic change may finally and pathologically override all other mechanisms. Lovelock was initially a marginalized figure in science, a "heretic," and thus a good voice to bring into a Trialogue framework.

Janet showed links between long time frames and urgent questions of climate change today by pointing to a map showing where stromatolites are

found today, "to look at how sea levels in Australia have changed," and an interactive game showing effects of raised sea levels in Sydney, up to fifty meters.

JANET: And this really brings home to people . . .
JANN: There's my house!
JANET: Yes. And that's what people say! People play with this, and they look for the point at which their own house, or their own neighborhood, goes under water.

The Trialogue principle applies to both comments and exhibit. The exchange between Jann and Janet, scientist and curator, shows close convergence between them and the visitors who love this exhibit. Trialogues do not always show convergence—disagreement is also normal in trialogues—but such convergence contributes to their dynamic quality, their capacity to facilitate great changes.

What they converge around is the problem of different time scales raised by Lambeck. The long time of science, the shorter time frames of individual lives, and the moment of the exhibition merge as visitors pass through a century in the minutes it takes to slide the scale up and down. In this interaction, viewers are active. They ask their own questions and receive their own answers, and respond to those answers with other questions.

They may push questions beyond the limits of science. Responsible scientists might not predict sea levels rising by fifty meters in a century, because that could seem unlikely and terrifying. Yet visitors can play with that possible future without feeling terrified. In the process they do on a small scale what scientists do with computer modeling. Cardinal Pell objected to scientists' use of computer projections. Young visitors can feel the attraction of these methods, like the computer games many play, without confusing them with reality. Multi-modal expertise is a resource many visitors bring to museums.

In this example, interaction stops short of trialogic interaction involving visitors and others. Visitors create images for themselves, and neither scientists nor museum staff see what they do. This technology could easily allow other visitors, and the museum itself, to know what the cumulative patterns of the choices were (e.g., which level was seen as most likely or most threatening). This, in turn, could be fed back into science and policy circles as data on social and emotional aspects of climate change, currently a weak point in the scientific understanding of climate change.

CONCLUSION

Impending climate change is a major problem for the planet, calling for responses beyond business-as-usual from everyone, including the science

and museum sectors. But because it is a "wicked problem" there is no single solution or quick fix. This chapter recommends that this inherent complexity and uncertainty is best managed by an approach that incorporates and manages it, rather than one that seeks to confront and control it. Linear deficit/bullet models are still dominant in public communication, and still have a place. But for messages around "wicked problems" they are ineffective or dangerous. They encourage confrontations or disengagement.

For this situation this chapter develops the Trialogue principle. As a research tool trialogues have many of the merits of focus groups, but they are more creative and cut deeper. Experts can go further than they would with only other experts. Incorporating the different expertise of others can collaboratively push at the boundaries of current practices. For museum communicators the principle can open up new options for communication, engaging with a wider range of publics, more relevant to more visitors. It takes the risk that publics will be too active, and take what seem the "wrong" messages into their life. But if the public cannot be trusted, if they are seen as "unwashed," then there is probably no hope for the planet. Trialogue strategies rely on and build trust.

REFERENCES

Australian Academy of Science (AAS). 2010. *The Science of Climate Change: Questions and Answers.* Canberra: AAS.

Bakhtin, Mikhail. 1996. *The Dialogic Imagination,* edited by Michael Holquist. Austin: University of Texas Press.

Berger, Andrew. 1995. *Essentials of Mass Media Communication.* London: Sage.

Chou, Hsing-Chun. 2002. *Joyce, Bakhtin and the Postcolonial Trialog.* Glasgow: Glasgow University Press.

Collins, Harry and Trevor Pinch. 1993. *The Golem: What Everyone Should Know About Science.* Cambridge: Cambridge University Press.

Diacin, Florin. 1996. "The Solution of the n-Body Problem." *Mathematical Intelligencer.* 18(3), 66–70.

Hodge, Bob. 2011. "Museums and Attacks from Cyberspace: Non-Linear Communication in a Postmodern World." *Museums and Society* 9(2): 107–122.

Hooper-Greenhill, Eilean. 1999. *Museum, Media, Message.* London: Routledge.

Hulme, Mike. 2009. *Why We Disagree about Climate Change. Understanding Controversies, Inaction and Opportunity.* Cambridge: Cambridge University Press.

Kress, Gunther. 2010. *Multimodality.* London: Routledge.

Locke, Simon. 1999. "Golem Science and the Public Understanding of Science: From Deficit to Dilemma." *Public Understanding of Science* 8: 75–82.

Lovelock, James. 2000. *Gaia.* Oxford: Oxford University Press.

Lovelock, James. 2009. *The Vanishing Face of Gaia.* London: Allen Lane.

Mandelbrot, Benoit. 1993. "The Fractal Geometry of Nature." In *The New Scientist Guide to Complexity,* edited by Nina Hall, 122–135. Harmondsworth: Penguin.

Newton, Isaac. 1995/1687. *The Principia.* Amherst, NY: Prometheus Books.

Pearce, Susan. 1999. "Collecting as Medium and Message." In *Museum, Media, Message,* edited by Eilean Hooper-Greenhill. London: Routledge.

Pell, George. 2009. *Global Warming Pauses*. sydney.catholic.org.au/people/archbishop/stc/2009

Pell, George. 2011. *Our Christian Perspective on Climate Change*. sydney.catholic.org.au/people/archbishop/stc/2011

Plimer, Ian. 2009. *Heaven and Earth. Global Warming, the Missing Science*. Ballan, Victoria. Connor Court Books.

Poincaré, Henri. 1993. *New Methods of Celestial Mechanics*. New York: American Institute of Physics.

Rittel, Horst and Marvin Webber. 1973. "Dilemmas in a General Theory of Planning." *Policy Science* 4: 155–169.

Programming Interlude III Visualizing Climate Change

Beyond Technological Enchantment and Critical Deconstruction

Tina-Simone Neset and Ola Uhrqvist

Climate change is one of the major global concerns of our time and subject to numerous efforts to convey the inherent complexity, uncertainty and urgency in climate science and policy issues. Development in information and communication technology has led to rapid advancements in climate visualization to support understanding of climate science in a broader sense, including the causes and effects of climate change as well as links to climate mitigation, adaptation and related policies. Several applications have been developed and applied in this field, ranging from single visual representations of data or illustrations of potential changes to interactive interfaces to create visual representations for selected parameters as a means for data exploration (e.g. Neset et al. 2013; Sheppard 2012; Wibeck et al. 2013).

Since 2009, researchers at Linköping University have collaborated with the Swedish Meteorological and Hydrological Institute and Norrköping's Visualization Centre-C to develop presentations on the causes and impacts of climate change for public as well as expert audiences. These presentations are predominantly displayed in immersive settings, either in the full-dome theatre at the Visualization Centre-C with 100 seats or in a smaller geodome[1] environment. The mobile geodome, providing space for twenty to twenty-five visitors, mostly sitting (or lying) on the floor, has been transported to multiple events around the Baltic Sea for presentations at conferences and stakeholder meetings, ranging from ministries to schools, public events and thematic exhibits. Both settings apply Uniview,[2] an interactive software that allows the display of geospatial data and features visualization of the atmosphere as well as flights from space to earth, enabling the reenactment of the iconic "Blue Marble" view of the Earth from space. In the full dome theatre a custom-developed software provided an environment for the production of the full-dome movie *A Warmer World,* aimed at students age 11 upwards and adult audiences.

Equipped with scientific data, sophisticated visualization technology and an immersive communication environment, the potential effects can be compared with once novel technologies such as natural history museums, radio and television where the impressive medium itself had convincing power. Therefore, lingering at the heart of our communication are reflections of

how to present scientific knowledge in ways that facilitate open-ended discussion rather than provide easily digestible answers. Experiences from visualizing climate change for audiences ranging from European environmental ministers to Greenlandic pupils have enabled us to develop communication beyond technological enchantment and critical deconstruction.

Going far beyond producing attractive pictures, these visualization efforts connect data-analysis, decision support and communication (Figure III.1). Visualization for data analysis draws on research and development in information visualization. These visual representations are not by default intuitive but become meaningful in particular ways depending on the user's specific contexts. Particularly valuable are visualization techniques and applications that support analysis and interpretation of complex, multi-parameter and time-dependent data as well as the exploration of linkages between environmental and social systems, such as interactions between natural systems, lifestyles and policies. For the scientific community, climate

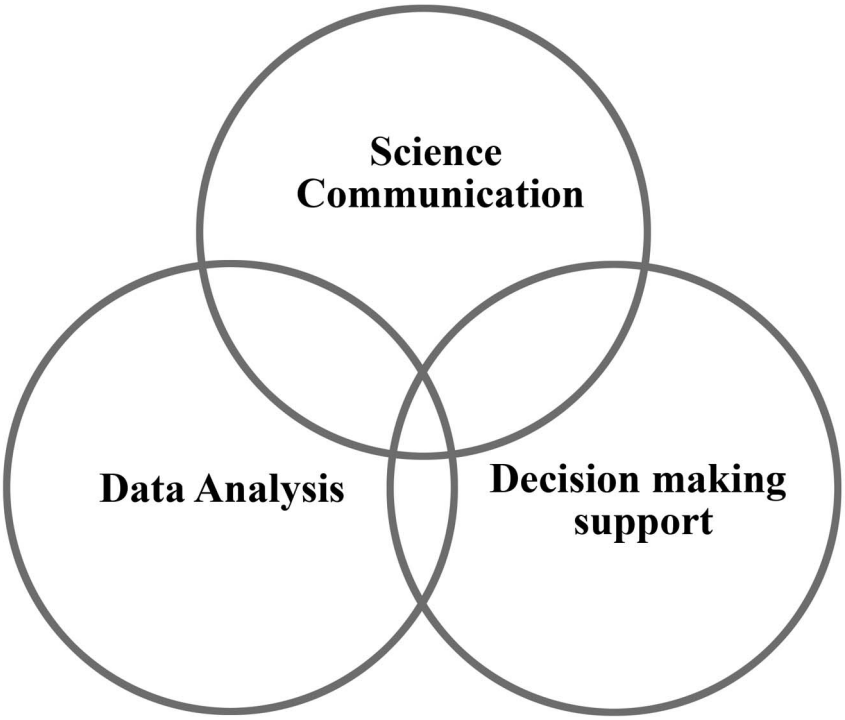


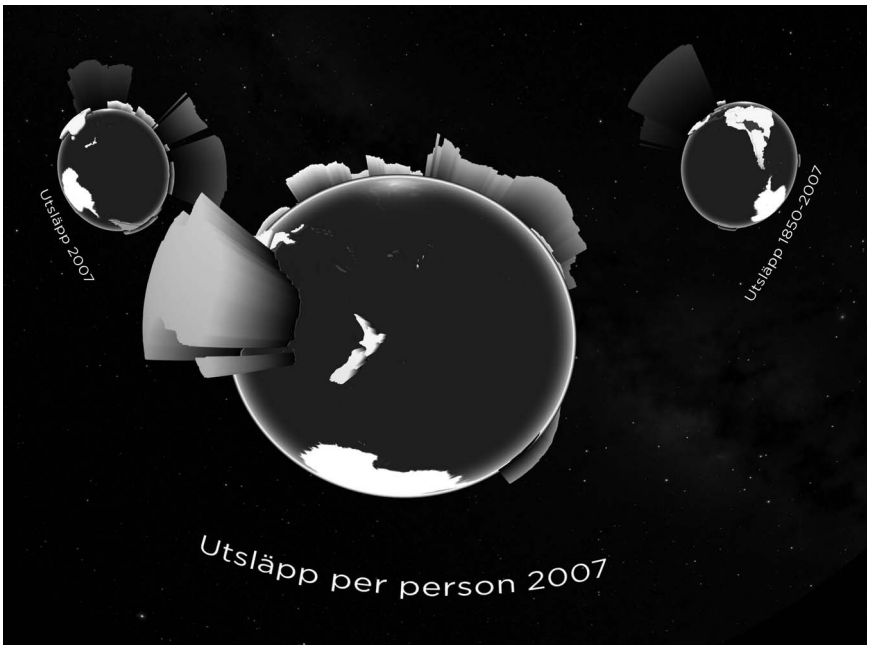
Figure III.1 Climate visualization, comprising the dimension of data analysis, science communication and decision-making support. Credit: Tina Simone-Neset, 2009.

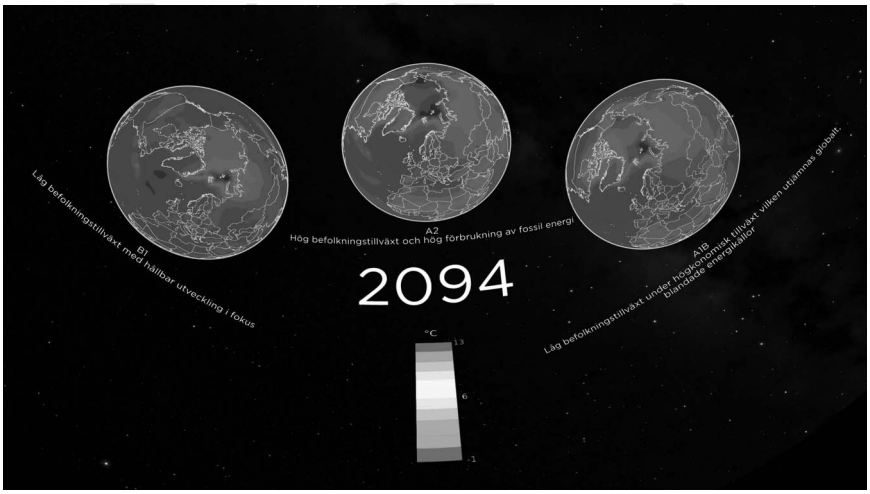
visualization provides new tools for communicating the vast amount of data generated on climate change–related issues, global greenhouse gas emissions, scenarios, risks, mitigation and adaptation options. It provides the possibility to represent time series of multi-parameter data or the regional distribution of climate change impacts as well as tools for visual representations of local changes to create a strong sense of place and understanding of vulnerability and adaptation efforts for the audience.

Presentations in the geodome are highly interactive with a climate expert or researcher present guiding through the narrative asking and responding to questions, thus enhancing dialogues adapted to the participants. The data displayed in the geodome is selected to match certain narratives either on climate change in general (including e.g., temperature and precipitation changes, as well as representations of greenhouse gas emissions) or for the impacts of climate change on a geographic area (e.g., the Baltic Sea Region) or a specific sector (e.g., agriculture). However, running the same presentations for larger audiences in the full dome theatre limits interactivity. This challenge guided the creation of a movie based on the same visualizations but also enabling new features such as the display of multiple globes, to present different climate scenarios simultaneously and thus expand on the role of scenarios in climate change research and policy making. To facilitate discussions we provided space for more than one story, as exemplified by the triple visualization of data on emissions (Figures III.2 and III.3). Presenting three datasets combined enables the comparison between different ways of accounting for global greenhouse gas emissions, and facilitates discussions on national responsibilities for climate actions, nested at the heart of United Nations Framework Convention on Climate Change[3] negotiations.

Uncertainties in climate change data are approached through the visual representations of scenarios and storylines used to describe the future development of society. Figure III.3 shows the approach of representing three climate change scenarios A2, A1B and B2, and changes in annual mean temperature over time to facilitate a discussion on alternative futures. To capture the openness of a dialogue format throughout the film, we also developed a narrative in which three individuals (a student, a climate researcher and an industrial representative) approach the storyline from different perspectives. In that sense, our contribution to the discussion on climate change was to include several different perspectives, supported by visual representations of alternative scenarios as well as mitigation measures. To support in-depth and critical discussion around the selected narrative we produced supplementary material that, among other things, asked for other possible narratives and voices. A desirable continuation of the efforts to include even more perspectives would be a platform enabling any user to visualize their own climate narratives using advanced web-based data visualizations.

Our experiences of using ICT-based tools for communication highlights its value in enhancing discussions. Equally important is to engage a comprehensive range of expertise and experiences to reflect on the epistemological





Figures III.2 and III.3 Visual representations of greenhouse gas emissions (left) and global temperature change from the full-dome movie *A Warmer World*, created in the ICE dome software. Credit: Norrköping Visualization Centre-C.

conditions and consequences of climate visualization, particularly their impact in different settings. Through the collaboration between climate science and policy researchers, visualization experts and pedagogues we have

created a unique learning environment. Our work with climate visualizations as a closely knit web of expertise and user interaction opens new spaces for serious reflections on how to know, see and govern climate change.

NOTES

1. The Geodome, geodome.info
2. SCISS (Uniview software), sciss.se/uniview.php
3. UNFCCC refers to the United Nations Framework Convention on Climate Change (unfccc.int)

REFERENCES

Neset, Tina-Simone, Björn-Ola Linnér, Erik Glaas, Carlo Navarra, Jimmy Johansson, Tomasz Opach, Jan Ketil Rød, Anne Gammelgaard Ballantyne and Michael Goodsite. 2013. *Hac Vita Project Briefing* No. 1, 2013. CSPR Briefing No. 10. Centre for Climate Science and Policy Research, Linköping University, Norrköping, Sweden.

Sheppard, Stephen R.J. 2012. *Visualizing Climate Change. A Guide to Visual Communication of Climate Change and Developing Local Solutions*. London: Routledge.

Wibeck, Victoria, Tina-Simone Neset and Björn-Ola Linnér. 2013. "Communicating Climate Change through ICT-Based Visualization: Towards an Analytical Framework." *Sustainability 5:* 4760–4777.

9 Portraying the Political

Contemporary Art Exhibitions and Their Engagement with Climate Change Politics

Kellie Payne

In December 2009, public awareness of climate change reached a zenith as the world prepared for the climate change negotiations that were to take place in Copenhagen as global leaders convened for the UN climate summit, COP15. Tracking coverage of climate change and global warming in a selection of fifty global newspapers, Max Boykoff (2010) found increases across the board at the end of 2009, owing to the coverage of COP15 and the University of East Anglia Climatic Research Unit hacked emails story. In Europe alone, there was a 67% increase in comparison to the start of the year (Boykoff 2010). Climate change was a part of the zeitgeist. The art world did not miss its chance to engage with this culturally significant topic.

To coincide with COP15, two contemporary art exhibitions were staged in the UK: in London at the Royal Academy of Arts and in Bristol at the Arnolfini Gallery. Both exhibitions were expressly "about" climate change, yet their curators took decidedly different approaches to the topic. These will be examined to establish how the exhibitions' disparate approaches to the political result in different levels, types and quality of engagement with the issue.

Climate change is an issue highly entangled with science and politics. The predictions and climate models are based in science, however, the push to envision ways to cope with the issue as a society is dominated by climate change governance, particularly at the global level. Politics, in this context, is dominated by questions about what sort of collective action should be taken to both adapt to and mitigate climate change. It involves the processes of argumentation, negotiation and a struggle over contingencies (Dessler and Parson 2010).

These major, themed exhibitions are examples of the world of contemporary art grappling with the topic of climate change. By examining differing curatorial approaches to the topic we can better understand the role of art in relation to climate change politics and, more generally, raise questions about the role of the visual arts and the public art gallery in addressing controversial contemporary social and political issues.

WHY AN ARTISTIC RESPONSE TO CLIMATE CHANGE?

> Climate change is not "a problem" waiting for "a solution." It is an environmental, cultural and political phenomenon which is reshaping the way we think about ourselves, our societies and humanity's place on Earth. (Hulme 2009, front plate)

Climate change has been largely defined and subsequently analyzed from various scientific perspectives in disciplines ranging from meteorology, geology, climate modeling, physics, chemistry and biology. It has become a global political issue, concerning scientists contributing to the IPCC, and governments involved in climate change negotiations through the UN framework convention for climate change and various national directives. It has been addressed economically, most notably by the *Stern Review on Climate Change Economics* published in 2007. It has implications for development and global justice movements as well as global energy policy.

If climate change is so often understood in scientific and political terms, what might art and visual culture add to our understanding of the issue? Mike Hulme, in his concluding chapter of *Why We Disagree about Climate Change,* makes a case for a better cultural understanding of climate change. According to Hulme, "we need to understand the ways in which we talk about climate change, the variety of myths we construct about climate change and through which we reveal to ourselves what climate change means to us" (Hulme 2009, 355). He is optimistic that we are "creating ways to give new meaning to climate change as it circulates through our imaginative and social worlds." And it is here where art and culture become important. "As a resource of the imagination, the idea of climate change can be deployed around our geographical, social, and virtual worlds in creative ways. It can inspire new artistic creations in visual, written and dramatized media." Hulme argues that artists, among others, can "use the idea of climate change—the matrix of ideological functions, power relationships, cultural discourses and material flows that climate change reveals" as "both a magnifying glass and as a mirror" (Hulme 2009, 362–363). This notion of art serving as a mirror is a common view and is mentioned in a discussion of art by the French theorist Jean Baudrillard, "Art can become a sort of sociological, socio-historical or political witness. It then becomes a function, a sort of mirror of what the world has in fact become, of what will become of it, including its virtual involvement. We may have reached farther into the truth of the world and of the object" (Baudrillard 2005, 63–64).

Becker (1997) explains that one of the ways artists seem to work is that they hold reality at a distance, a distance from which they can then examine and study it. By doing so, they move into a realm of abstract thought which "creates a symbolic representational universe which exists in a tangential relationship to what we term reality." For her, what this distancing does in practice may not

result in a direct impact on the world but rather it affects "thought and emotion at a symbolic level—it shifts the psychic terrain" (Becker 1997, 202).

There are differing views about what form the role for art might take in addressing climate change. Some, such as Gerald Bast (2010) see it as a way of communicating difficult scientific and political concepts. He says, "Precisely because 'pictures' and art are more powerful than that which we recognize as 'reality,' it would seem to be especially worthwhile to help communicate the facts and figures relating to global climate change, which are substantiated by scientific knowledge, by the means of art and thus promote problem awareness and a readiness to take socio-political action beyond expert circles" (Bast 2010, 13).

In contrast, Anne-Sophie Witzke, manager of the *Rethink: Contemporary Art and Climate Change* project, a series of exhibitions held in Copenhagen and across the Nordic countries in 2009 and 2010 to coincide with COP15, believes we have all the information on climate change we need. According to her, "the expert reports appear regularly with thousands of scientists accumulating mounds of data of human impact on the environment. The crisis here is how the information doesn't shift behaviour; it doesn't generate the political will to respond effectively" (Bunting 2010). Therefore, any successful art about climate change will not merely regurgitate the scientific data.

While there are many theories about how art might speak to social and political issues it, is widely acknowledged that it can play a role. This can therefore be extended to climate change. Art that addresses climate change offers opportunities to approach the topic from a new perspective and create a new space for the contemplation of the issues.

ART HISTORICAL PRECEDENTS: ART AND ECOLOGY

Art work about climate change is not the first instance of art exploring ecological or environmental concerns. In the summer of 2009, the Barbican in London held an exhibition *Radical Nature: Art and Architecture for a Changing Planet,* which, in many ways, served as a retrospective, exploring ways in which ecology and the environment have been explored in art from 1969–2009. In his exhibition catalogue essay, "The Politics of Sustainability: Art and Ecology," art historian T. J. Demos outlines key movements in recent art history where art was entwined with ecology.

Early environmental art developed in the sixties and later as a response to the growing social and political concern for environmental issues. At this time a model developed of what Demos terms "restorationist eco-aesthetics" which refers to "art that attempts to repair damaged habitats or to revive degraded ecosystems." Included among these are works by Hans Haacke, Agnes Denes, and Joseph Beuys and their work "attempted to rescue natural environments from polluted conditions" (Demos 2009, 19). One of the

problems, Demos notes, with these early attempts is the separation of nature from culture, whereby "nature ends up objectified as an ontology divorced from social, political and technological processes" (Demos 2009, 20). This is problematic because it "reproduces the very objectification of nature that has got us into trouble in the first place" (Demos 2009, 20).

Reviewing the Barbican exhibition for *The Guardian,* Madeline Bunting characterizes this work as having:

> inspired a critique of spectacle capitalism and globalization on the part of a number of artists working in the advanced economies. They developed practices—usually entailing research over time, widespread public involvement, and lengthy, didactic presentations—that critically trace and strikingly display the global movements of the new world disorder between the advanced economies and those connected in multiple ways with them. (Bunting 2009a)

In his book on contemporary art, Terry Smith (2009) separates current art practice into three different currents. He differentiates what might be termed "ecological art" from other types such as "spectacle art," art practiced by artists such as Jeff Koons and Damien Hirst, who Smith says "embrace . . . the rewards and downsides of neoliberal economics, globalizing capital, and neoconservative politics." He describes artists producing art in a current which could be described as ecological art as "working from similar perspectives, other artists were inspired to base their practice around exploring sustainable relationships with specific environments, both social and natural, within the framework of ecological values" (Smith 2009, 9).

It is important to see climate change art within the context of previous ecological art, as it is in many ways the next logical iteration in a long trajectory of ecological artworks, which began responding to the environmental crisis in the 1960s.

AN INTRODUCTION TO THE CONTEMPORARY ART EXHIBITIONS

The following section introduces the two contemporary art exhibitions being used as examples: the Royal Academy of Arts' *Earth: Art of a Changing World* and *C Words: Carbon, Climate, Capital, Culture* at the Arnolfini Gallery in Bristol. The Royal Academy show was predominantly traditional forms of contemporary art: sculpture, paintings, photographs, installations and videos. The artist-activist collective PLATFORM curated the exhibition at the Arnolfini. Their choice of artist commissions and an events program is discussed. This section establishes the two differing curatorial approaches to the issue of climate change and their orientation to its politics.

ROYAL ACADEMY OF ART: *EARTH: ART OF A CHANGING WORLD*

The *Earth* show at the Royal Academy ran from December 3, 2009 to January 31, 2010 and comprised thirty-six works of art by twenty-nine artists. Many artists included in the show were internationally renowned, such as Antony Gormley, Tracey Emin, Mona Hatoum, Cornelia Parker, Gary Hume, Edward Burtynsky and Sophie Calle (Royal Academy of Art 2009). Its galleries were arranged into a loose narrative structure with the galleries broken up into a series of differently themed exhibitions that flowed from one gallery to the next. Crang, citing a study by Duncan and Wallach (1978), describes the way in which curators, by configuring artifacts [AuQ15] in the museum space by virtue of its particular layout, create a "script" for encountering the exhibit, "implying that spatial arrangement can place exhibits in a story" (Crang 2003, 260).

Spread among rooms on the upper level of the Royal Academy's Burlington Gardens building, the exhibition was divided into five sections. First, galleries introduced the issue with works on earth, air, sky, nature and carbon, then moved on to a section on "perceived reality," which sought to examine the perceived security of our existence. Then there was a section on the artist as explorer and reflector, which sought to examine artists' roles in relation to climate change and was largely the result of work created by artists who had been on Cape Farewell expeditions to the Arctic or the Andes (Cape Farewell is an organization founded by artist David Buckland that takes artists on scientific expeditions, mainly to the Arctic, to better understand climate change.). Next was a section on destruction, followed by a gallery titled "The New Reality," which purported to offer a look at the world of vision and hope that might be brought about through a cultural shift (Royal Academy of Art 2009).

The exhibition's curator, Kathleen Soriano, made explicit her desire not to be too didactic about the issue of climate change, stating: "the exhibition does not aim to preach or admonish, whilst at its heart sits the overwhelming quality of the individual works and the overall aesthetic, visual, and experiential impact that the exhibition strives to achieve." She further explains, "I didn't want penguins or icebergs. There's nothing literal. We're not offering information—if visitors want that, we have a website. We wanted people to have an aesthetic response" (Bunting 2009b).

The curator, therefore, desired to allow for some ambiguity around the works of art and their possible connections to climate change. Edelman, in his book *From Art to Politics,* believes this sense of ambiguity often found in art, where meanings aren't explicit, allows for provocation which, when a work is too explicit "terminates wonder and analysis" (Edelman 1995, 61).

One feature of the *Earth* exhibition was the curatorial decision to show older pieces which had perhaps been created or displayed in the past in different contexts to climate change and re-packaged with the exhibition's

climate change narrative. Writing about the "poetics, politics and interpretation of exhibitions," Mike Crang (2003) points out that it is by combining and recontextualizing objects that exhibitions gain their importance. Robert Storr, art historian and curator, describes the hallmark of a good group show, which features the work of an assortment of artists, is to create "some kind of texture out of the variety of art—against which individual works can mean more" (Thornton 2009, 228). In regards to exhibition displays Crang writes, "this is less about individual items than the combination of them. It is also important to note that this is about the combination and disposition of objects in space. This then is not just a semiotic relationship between sights, symbols, and the like. It is about the poetics of putting artefacts and exhibits together in particular configurations" (Crang 2003, 260).

Julie Doyle, writing about *Earth,* notes the effectiveness of two art works in particular that were recontextualized for the exhibit. Both pieces of work, Antony Gormley's *Amazonian Field* and Mona Hatoum's *Hot Spot,* were not originally made to directly address climate change. However, within the context of the exhibition they take on new meanings. Further dimensions are evoked as, as Doyle asserts, "we interpret (the) work though a different set of knowledges and imagination," which the exhibition contextualizes. Doyle finds both pieces of work compelling and rich in their new contexts and for her, "what makes both of them work as visual arts engagements with climate change is that they call upon the viewer's own set of values, knowledges to interpret their meaning" (Doyle 2011, 148).

Guardian art critic Madeline Bunting argues that this recontextualization may be the result of the environmental crisis becoming a dominant theme of contemporary art. But she also notes that this dominance can be seen as controversial, saying it might be "regarded by some as a dangerous instrumentalization of art, by others as an entirely necessary outcome of the role art plays" (Bunting 2010).

Primarily through the recontextualization of already existing pieces of work, the curators at the Royal Academy of Arts developed a show that focused primarily on the phenomenological aspects of climate change: what will it look like (the "destruction section") and what will be involved (e.g., the introductory "earth, air, sky, nature and carbon" section)? As such, it dealt less with the political element, which involves the question "what are we to do about it?"

ARNOLFINI GALLERY IN BRISTOL: *C WORDS: CARBON, CLIMATE, CAPITAL, CULTURE*

While the curators at the Royal Academy didn't want the political debate to dominate, *C Words* on the other hand did not shy away from climate change politics. The exhibition took place in October and November 2009 and was part of the Arnolfini's "100 days," a program of events which was scheduled

to count down to COP15. It was curated by the artist-activist collective PLATFORM and consisted of seven artist commissions, which included installations, performances, actions, walks and courses that amounted to more than eighty events. According to PLATFORM, it is their mission to combine the "transformative power of art with the tangible goals of campaigning" (www.platformlondon.org/index.asp) and therefore addressed the political questions raised by climate change head on and were not afraid to resort to polemical rhetoric or avoid any overt political messages.

James Marriot, of PLATFORM, believes that contemporary visual art is "re-finding a powerful sense of purpose" (Bunting 2010). He takes inspiration from the artist and social activist Joseph Beuys. A number of the artists and events run as part of the *C Words* exhibition involved moving outside of the gallery space and taking their protests to the streets. Gavin Grindon (2010) found one project, the Lab of Insurrectionary Imagination's *Bike Bloc,* commissioned by PLATFORM for *C Words,* to be what he called "without a doubt the most ambitious and radical of the activist art projects." Bringing together bike enthusiasts, artists and activists and using discarded bicycles, it sought to design and build a new practice of civil disobedience to be taken to the Copenhagen protests. This practice represented for Grindon a point in which the artists were truly immersed with the social movement and commended the Arnolfini for supporting what he calls "genuinely activist practices" (Grindon 2010, 12).

The art being shown at the Arnolfini would fit more into the category described by curator Nicholas Bourriard (2002) as "relational aesthetics." Or what art historian Claire Bishop (2006) terms an "art of participation" in which the type of audience participation required in an exhibition such as *C Words* often times seeks to empower the participant socially and politically. According to Bishop, the artist wishes to create a situation whereby the participant is deemed an "active subject" who, upon their emancipation by engaging with the art, will be able to "determine their own social and political reality" (Bishop 2006, 12).

The exhibition at the Arnolfini also seems to sit well with Hilde Hein's description of this new genre of public art because the artwork might not necessarily be a "thing" but "the relationship between and among artists and publics—a process not a thing" (Zuidervaart 2011, 121). Hein's further characterization of this type of art seems to accurately describe PLATFORM's approach to the *C Words* exhibition because she says the art object is dematerialized and decommodified. There weren't many objects on show at the Arnolfini, the gallery space was largely used to host events and discussion or view processes such as Ackroyd and Harvey receiving the sapling trees for their project *Walking Forest* or a room devoted to the construction of the *Bike Bloc*. For Hein, discussion itself can become the work of art. "Public debate, dialogue, and analysis are the "substance" that purportedly outlasts artifacts and temporal events and may be renewed at will independently of authorial intention" (Hein, in Zuidervaart 2011, 121).

Artist duo Ackroyd and Harvey were a rare case in that they exhibited work in both exhibitions. At the Royal Academy show, they had two pieces of work. *Beuys' Acorns* featured the saplings being grown from acorns collected from the original oak trees in Kassel planted by Joseph Beuys for the 1982 Documenta. Second was a piece commissioned especially for the exhibition, *Polar Diamond,* which is a diamond made from the extracted graphite from a cremated polar bear bone. In addition to their two pieces in the exhibition, Heather Ackroyd and Dan Harvey also hosted a discussion series over the course of the exhibition on Friday evenings where topical speakers were invited in for discussions with the artists and the audience. Speakers included Jim Smith of the Forestry Commission, the lawyer and activist Polly Higgins, and the writer Jay Griffiths. At *C Words,* for their project *The Walking Forest,* they collaborated with the charity Sustrans, and invited visitors to the gallery to travel slowly and bring with them saplings which were later planted by Tree Bristol along cycle paths in Bristol.

In an interview with the artists, I asked them to judge the impact of the two exhibitions and wondered which of the two exhibitions they would send a visitor to, if that visitor could only visit a single exhibition. The question proved tricky, as the artists felt each exhibition had its own merits, but when pushed, they both settled on the Royal Academy exhibition, but upon further discussion, both were not happy with this singular answer. For them, both exhibitions had their merit. Heather complemented the curators from PLATFORM, Jane Trowell and James Marriot, for doing a good job at straddling the artistic and activist divide. However, Heather did find that some of the activist groups invited into the gallery didn't do this as well, and at times the activism outweighed the art and the aesthetics which, as an artist, she found problematic. In contrast, the criticism she had heard leveled at the Royal Academy was that it was too aesthetic and too polite. Heather therefore felt fortunate that she and Dan were able to "cover all bases" by participating in both exhibitions (Heather Ackroyd and Dan Harvey, personal communication, June 17, 2011).

However, she thought that while *C Words* really succeeded in challenging peoples' conceptions, it did so by relying too heavily on dialogue and the spoken word and it resembled more of a theater performance than a work of visual art. She contrasted this with the *Earth* exhibition, where at the Royal Academy you could see thirty well-known artists making their response to climate change. This she felt, may have afforded a better chance of communicating. Dan concurred; finding the Royal Academy exhibition very polished. He described the Bristol exhibition as "rawer and slightly more on the edge" while the Royal Academy was "very safe" (Heather Ackroyd and Dan Harvey, personal communication, June 17, 2011).

Artists Ackroyd and Harvey were uniquely placed to highlight some of the key differences which could be observed about the two exhibitions presented here. In particular, there is a difference in curatorial choices between the Royal Academy's decision to present an aesthetic display of objects and

PLATFORM, who chose to implement a public participatory approach using artist commissions and managing an event schedule totaling more than eighty events in and around the gallery.

THE ART MUSEUM AND THE EXHIBITIONS' RELATIONSHIP TO ART WORLD NORMS

Another factor to consider when examining these exhibitions' relationship to the political is to highlight the role of the museum or art institution. What does it mean to have the art exhibited in this context and how does the positioning of the institution impact the outcome of the exhibition? This is particularly pertinent to PLATFORM's relationship to the Arnolfini. Unlike the Royal Academy, whose exhibition was curated by art world professionals and closely embodied their norms, PLATFORM is an activist organization, invited into the gallery to curate a show. This meant that a number of tensions arose.

These exhibitions are situated within the context of the art gallery. Public art galleries perform a number of distinct roles (Duncan 1991) and can be considered as a particular type of art museum. Places which display contemporary art vary from the private gallery, to the public gallery to the established museum. Institutions referred to as art museums tend to have permanent collections and art of historical importance whereas public galleries don't necessarily have permanent collections and tend to showcase more contemporary works. However, in the context of this discussion much of what is said in the museum studies literature applies also to the contemporary art gallery. First, art museums have been likened to ceremonial spaces such as temples or cathedrals. As such, museum spaces encourage a certain type of receptivity: "museum space is carefully marked off and culturally designated as special, reserved for particular kind of contemplation and learning experience and demanding a special quality of attention—what Victor Turner called 'liminality'" (Duncan 1991, 91). Further, the museum plays a unique role within the political structure: "such public institutions made (and still make) the state look good: progressive, concerned about the spiritual life of its citizens, a preserver of past achievements and a provider for the common good" (Duncan 1991, 93).

The study of art museums and exhibitions is also significant because they represent a key component in the "fine-arts distribution system" (Alexander 1996). "Museum exhibitions are the primary way in which the public experiences art. Moreover, art exhibitions help shape trends and fashions in the high art world. Museums have a central place in defining art" (Alexander 1996, 89). Exhibitions have been delineated into three types including traveling, blockbuster and theme. The two exhibitions featured here fit into the category of "theme," which are denoted by their organization around a theme or motif, in this case climate change, rather than an art-historical

category. Of this type of exhibition, Alexander says, "this type of popular exhibition is not new. However, theme exhibitions became more ambitious as it became possible to attract outside funders for them. Theme exhibitions have become more prevalent over time, and are increasingly funded" (Alexander 1996, 117).

Adherence to art world norms for large exhibitions is characteristic of the *Earth* exhibition. Its choice of artists, its traditional hang, all reproduce many of the expected characteristics of an exhibition in a contemporary art gallery or modern art museum. This includes the artists whose work was chosen and the characteristics of the art itself: consisting largely of traditional art objects such as paintings, drawings, photographs, and sculpture with some new media also included. The artists represented were among the art-world elite, a large proportion being internationally renowned artists with their reputations reinforced by exhibitions at international Biennials, Turner prize nominations and membership in the Royal Academy of Arts. Sociologist Sarah Thornton (2009) selected the Venice Biennale and the Turner Prize as two of her emblematic sites when she investigated the art world in *Seven Days in the Art World,* and highlights the importance of these events in reproducing art world norms and further enforcing their hierarchies.

PLATFORM, on the other hand, was uncomfortable within the confines of the art institution and sought to bring attention to the tension between activism and the artistic space. Jane Trowell, PLATFORM's co-director, noted how many of the people who attended their exhibition, particularly on the opening night, were not the usual people who would attend exhibitions at the Arnolfini. There was therefore some discomfort on the part of these attendees who weren't accustomed to the art gallery experience. Further discomfort was experienced by the gallery attendants whose role it usually is to, as Jane described, keep people from touching valuable art objects. In the PLATFORM exhibition, there weren't any objects of value and people were encouraged to interact with each other and the art work in the space. Therefore the role of the attendant became ambiguous. (Jane Trowell, personal communication, October 10, 2011).

In fact, PLATFORM was uncomfortable with the very concept of an exhibition. Originally, the gallery's director, Tom Trevor, invited PLATFORM to curate a twenty-year retrospective of its work. But the group's ideas about the exhibition evolved into *C Worlds* largely because of their discomfort with the concept of a retrospective. Wanting instead to use the opportunity of the time and space of the exhibition at the Arnolfini, PLATFORM wanted to create a politically relevant piece of work that didn't merely reflect their past work, but rather was active and engaged with the political currents and responded to the political events surrounding COP15 (Jane Trowell, personal communication, October 10, 2011).

Jane Trowell said that PLATFORM's involvement in a gallery exhibition brought up questions within the organization about whether a gallery was the best venue for their politically charged work (Jane Trowell, personal

communication, October 10, 2011). Theorist Chantal Mouffe (2010) has also wrestled with similar questions about how to best address democracy through art and whether this should occur within an institutional structure such as the museum, or if the only legitimately political art practice takes place outside the art institution. Mouffe argues for the need to re-establish the museum as a "crucial site of political contestation" expanding that "art institutions could foment new subjectivities critical of neoliberal consensus" (Mouffe 2010, 326).

The perspective Mouffe is opposing is one that articulates a view that the only way "critical artistic practices can have efficacy" is if they "take place outside the cultural institutions." It considers these institutions unable to "provide sites for critical political intervention" and instead this type of work must occur outside the "institutional field." Mouffe disagrees with this perspective as she believes it "impedes us from recognising the multiplicity of avenues that would otherwise be open for political engagement." Rather than deserting the public institutions, Mouffe argues for a different type of institutional critique, one that aims to transform the institution. Rather than being seen as "monolithic representatives of forces to be destroyed," these institutions, and engagement with them, would instead move into "a terrain of contestation of the hegemonic order" (Mouffe 2010, 326). PLATFORM reached a similar conclusion, which is why, in the end, they agreed to accept the Arnolfini's invitation to curate an exhibition in their space.

Tom Trevor, Director of the Arnolfini, echoes Mouffe's sentiments. He argues for a move to "more progressive institutions" that have a "radically different understanding of the public sphere and thus the structure of public spaces." Instead of imagining a single and passive public, what he terms "new institutionalism" will seek "to actively 'produce' multiple and diverse communities of interest as co-generators." By recognizing the diversity of interests among its publics, it uses this as a productive force "in which the public takes an active role as producer, and from which the new social and artistic structures can emerge within civil society." This enables the institution to become "a means for involving art in democratic processes, a means for re-politicizing art" (Trevor 2009, 14–15). [AuQ16]

Both of these exhibitions are a testament to the notion that a politically divisive topic, such as climate change can, by a variety of methods, be examined in the context of a museum or gallery space. However, in doing so, particularly when the political stance taken is from an activist perspective, in the case of PLATFORM, tensions may arise. But for Arnolfini, having PLATFORM in their gallery space created an opportunity for some of these tensions to be examined and worked through.

EXAMPLES OF THE POLITICAL: ALBERTA TAR SANDS

As established, both exhibitions had differing curatorial philosophies and approaches to the politics of climate change. The following section

examines this in greater detail by using the example of the highly politically contentious issue of the Alberta tar sands. Both exhibitions had work that addressed the issue, but they each had demonstrably different approaches to the topic.

One of the key issues of contention at COP15 was the Canadian development of its tar sands and the ensuing impact on its emission levels. Inside the Bella Centre, the Copenhagen location for the UN negotiations, after consistently topping the "Fossil of the Day" award board (an award presented daily at COP15 by The Climate Action Network to the country who performs worst in the daily negotiations), on December 18, 2009 Canada was finally awarded the "Colossal Fossil," the top prize for "Fossil of the Year" for the Canadian government's negotiating position in Copenhagen, which included its commitment to the controversial method of oil extraction (Fossil of the Day 2009). Canada was also the target of a stunt by Yes Men, the artist-activist duo who use satirical methods to raise awareness to various social issues including climate change. During the negotiations, the Yes Men released a faux press release from the Canadian government promising a reduction in their emissions by 40%, forcing the Canadian government to respond (Linkins 2010). As demonstrated by the level of activist attention in Copenhagen to Canada and its controversial tar sands development, it is no surprise that the Canadian tar sands were also highlighted in both the Royal Academy exhibition and at *C Words* in Bristol. However, the form and tone of the subject's treatment is indicative of the differing methods exhibited by the two curatorial teams.

At the Royal Academy, photographs from Canadian Edward Burtynsky were displayed. Taken from a larger series he has compiled titled *Oil*, which chronicles the current state of fossil fuel use, from its production through to consumption, in contemporary society. The photographs selected for the Royal Academy show were shots of the processing fields in Alberta. Paul Roth (2010) describes the photographs:

> in scenes of the surface mining that yields bitumen, vast pools of crude oil swirl and eddy: littoral zones of apocalypse. They offer a strange double mirror, reflecting both the clouds floating above and the reservoir below. Astonishing, beautiful even, they are the discharge of abscesses, man-made sores in the skin of the earth. The ruptures of oil's forced disclosure.

Roth believes Burtynsky's photographs evoke the aesthetic tradition of the sublime, which Edmund Burke described as the "evocation of anxiety in the face of nature" (Roth 2010). It has further been described as that which evokes a feeling of both "astonishment" and "horror." But as Pluhar (1987) reminds us, this horror is at a distance, it is "a horror that we feel only as we contemplate, without being in actual danger" (Pluhar 1987, xix).

During a tour of the exhibition led by the Royal Academy's Kim Jacobson in January 2010, Jacobson also drew upon the notion of the sublime when describing the power of Burtynsky's work. Stopping in front of the Burtynsky photographs she asked the tour group how the photographs made them feel. She explained:

> What I think most people find to be compelling images and then when you realise what they are you find yourself feeling incredibly guilty, thinking something so hideous . . . is so beautiful. Some of the pieces in the exhibition that are called destruction I think are the most beautiful pieces. But I think these two have a sublime . . . there's a sublimeness to them. Burtynsky says this, a lot of my work is beautiful but because of the beauty it will make people see the ugliness and you don't always have to show ugly to have ugly known. You can show ugliness in beauty. (Jacobson, 2010)

Ecological artist Jackie Brookner (1992) believes that one of the hallmarks of recent ecological art is to make visible elements of the world we have not necessarily wanted to see. This art, she says is "asking us to look at what our toxins, our garbage and overpopulation are doing to the earth" and to "acknowledge our own vulnerability and limitations" by looking at the destruction we are causing and acknowledging "that we humans are not the centre of the world" (Brookner 1992, 11).

The artist's voice doesn't necessarily stand in place of a political voice but rather, Burtynsky's work could be read as an addendum to the political. Its neutral voice works to make beautiful that which is considered by many an abomination and destructive act of violence striking the pristine landscape. This artwork works in tandem with the political. The photograph cannot do the work of a policy brief or an activist manifesto. Without any previous knowledge of the political wrangling behind the photograph, it is merely an industrial landscape, which can be read on a number of different levels, but in the first instance, it could be considered an aesthetically beautiful rendering. The scale of the photograph, taken from some height, allows the viewer to take in the large industrial site, evoking a sense of wonder. Its form of contemplation is of another quality: meditative and sublime. The view is unprecedented, the lightness of touch, which is characteristic of Burtynsky's style, moving upward away from the subject, a wide-angle shot taking in at the same time a vast space as well as a great level of detail. This bird's eye viewpoint distances the viewer and this distance is equivocated in the photograph's political perspective, imploring the viewer to look at this complex situation from another perspective. This is a perspective not grounded in political or economic debates. Here the situation is laid bare: look, inspect, contemplate, feel. The camera is put to service in the sole task of observation. And what is seen is both hideous and beautiful. The image therefore lacks the

suggestion of judgment or action. It points to the ambiguities that surround the issue.

C Words engagement with the Tar Sands was of a wholly different quality: mainly in the form of events. On November 13, at an event titled "Canadian First Nations Speak Out on the Tar Sands," the curators invited women from Canadian First Nations to explain the impact of what was termed, in the Arnolfini's literature as "the most destructive project on Earth" on their lives and communities. Three women were on hand to give "first-hand accounts of the devastating impacts of these massive oil extraction projects on the Athabascan Chipewyan, Lubicon Cree and other communities." In addition, the organizers sought for this event to connect the dots and "show how we are involved in these projects through companies such as Shell and BP, and the UK financial system and how we can act to halt the Tar Sands" (Arnolfini Gallery 2009a). Also, the *C Words* closing night party on Saturday November 28 was titled "Tar Sands Benefit Gig" and during an evening of "performance poetry, live acoustic music, bands, open mic and DJ" performances guests were asked to donate to the Canadian Indigenous Tar Sands Campaign (Arnolfini Gallery 2009b).

Sophie Hope, in an essay on the *C Words* exhibition, points out that "art and politics are often unhappy bedfellows," as their means and purposes are often contradictory. She notes that "on a sliding scale with art at one end and politics at the other, art demands a reflexive, questioning, poetic encounter with the world where the artist and viewer are not required to take sides, whereas politics assumes we have made up our minds and have a clear suggestion we want to communicate to the world" (Hope 2010). This is evidenced in the differing approaches to the issue of the tar sands in the two exhibitions. While the Royal Academy exhibition adopts this artistic, poetic approach, *C Words* adopted a less reflexive approach, making clear its political position on the issue. Hope concludes that "if politics was art, nothing would get done and if art was politics it would leave nothing to the imagination" (Hope 2010).

CONCLUSION

Creating art that has political links has been long been fraught, and "climate change art" is no different. With an extremely political issue such as climate change, there exists the risk of the artwork being labeled "propaganda." This raises questions about how clearly or in what way awork might be "about" climate change and hence, the scale or the degree to which work might be termed "polemical" or not.

Alison Tickell of Julie's Bicycle, a British not-for-profit organization that advises the cultural industry on sustainability, recognizes that while an artist may desire to actively campaign, a paradox often emerges with their work that she describes as "understanding that art is not forced" (Tickell 2010, 4).

Charlie Kronick clearly separates out art from polemic believing that art "loses its power" when it is polemical, as it is polarizing and loses its ability to speak to broader audiences (Arends et al. 2011, 66). He says:

> It has a divisive effect not just on the viewer but also on the makers. I've met artists who are profoundly moved by the impacts of climate change and are very, very worried about what the implications of a change in climate are for, not just for their own family but for society at large, but the last thing they want is to be described as a climate change artist. They feel quite strongly that it undermines the integrity and authenticity of their own work. (Arends et al. 2011, 66)

But self-proclaimed artist-activist group PLATFORM disagree. For it, "activists can be artists, artists can be activists, and activists can be found within cultural institutions." They define both the words "activism" and "art" as follows: "'activism', from PLATFORM's perspective is vision, collaboration, and action towards social and environmental justice: 'art' is an imaginative, sensual, skilled, social and powerful practice with impacts beyond rational explanation" (PLATFORM 2010, 17).

As Larsen (2010) explains, "The hybrid term 'art activism' was coined in the 1970s, the counter-cultures and student revolts of the late 1960s having paved the way for it. These movements 'posed questions to politics without themselves being reinscribed in a political theory,' as Michel Foucault put it, and thus often developed anti-authoritarian practices through aesthetic tropes of play and creativity" (Larsen 2010, 27).

However, while it is a delicate balance to create emotionally and symbolically powerful art with a political edge without tipping into the territory of polemic or propaganda, for Edelman in his book *From Art to Politics,* good political art can in fact "energize democracy." By helping to "create a public more aware of its interests" it can also "stir people out of an uncritical acceptance of conventional dogma" (Edelman 1995).

There is a strong argument for the cultural sphere to engage with the complex issue of climate change. This includes contemporary artists and their corresponding institutions: art galleries and museums. Continuing in an already well-established history of art that addresses environmental issues, art and thematic exhibitions about climate change offer viewers and gallery-goers an opportunity to contemplate various aspects of climate change anew.

C Words, in taking a relational or participatory approach, focusing more on the interactions between the visitors and the artists themselves, engaging them in discussion and activities, some, as Heather Ackroyd did, will argue that the more traditional aesthetic quality of an exhibition was therefore removed. The Royal Academy show was more traditional in its presentation of the art itself and in comparison to the politics on view at the Arnolfini, could be considered to be relatively neutral, politically. Their exhibition

presented art objects hung in a gallery space highlighting the aesthetic experience and were not didactic about the issue, but rather introduced elements of ambiguity and allowed space for interpretation, which is not to say that politics could therefore not be read into the works, it merely wasn't spelled out for viewers.

Thus, the different approaches taken by the curators of these exhibitions represent two different approaches to the political. One allows for more space and contemplation and another serves to bring attention to an issue, assert a viewpoint and call for action. The Royal Academy show, by being less didactic and openly political, allowed for more space to engage intellectually and emotionally with the issue. While the exhibit at the Arnolfini, in being more activist led, was more assertive in its political perspective, seeking to engage audiences by attempting to persuade them to understand and be involved with the political stances of its participants. This may have particularly appealed to those already involved with the issue, confirming and reinforcing commonly shared sentiments.

The exhibition at the Royal Academy succeeded in engaging with the issue on an aesthetic level, more so than the Arnolfini exhibition did. As such, the *Earth* exhibition displayed the ways in which climate change could be approached in a sphere, the aesthetic, which was separate from and different to the political and scientific. It is within this realm that more interesting possibilities for imagination and abstract thought about the issue might be achieved, and which deserves further exploration. While the Arnolfini exhibition broached the aesthetic with the political, in most instances, it erred on the side of the political which, as explored, can have the unintended consequence of stifling that other level of contemplation, which comes only within the aesthetic sphere.

REFERENCES

Alexander, Victoria D. 1996. "From Philanthropy to Funding: The Effects of Corporate and Public Support on American Art Museums." *Poetics* 24: 87–129. doi:10.1016/0304–422X(95)00003–3

Arends, Bergit, Robert Butler, Beth Derbyshire and Charlie Kronick. 2011. "Anatomy." In *Culture and Climate Change: Recordings,* edited by Robert Butler, Eleanor Margolies, Joe Smith and Renata Tyszczuk, 63–74. Cambridge: Shed.

Arnolfini Gallery. 2009a. "Canadian First Nations Speak Out on the Tar Sands." www.arnolfini.org.uk/whatson/events/details/546

Arnolfini Gallery. 2009b. "C Words: Tar Sands Benefit Gig and Last Night Party." www.arnolfini.org.uk/whatson/events/details/593

Bast, Gerald 2010. "Art, Science and the Universities in an Age of Climate Change—A Parallel Approach." In *Unfold: A Cultural Response to Climate Change,* edited by David Buckland and Chris Wainwright, 12–15. New York: Springer.

Baudrillard, Jean. 2005. *The Conspiracy of Art.* London: The MIT Press.

Becker, Carole. 1997. "Art and Ecology." *Review of Education, Pedagogy, and Cultural Studies* 19(2): 193–208. doi:10.1080/1071441970190203

Bishop, Claire. 2006. "Introduction." In *Participation: Documents of contemporary art,* edited by Claire Bishop, 10–17. London: Whitechapel and The MIT Press.
Bourriaud, Nicolas. 2002. *Relational Aesthetics.* Dijon: Les presses du reel.
Boykoff, Max. 2010. "Indian Media Representations of Climate Change in a Threatened Journalistic Ecosystem." *Climatic Change* 99(1): 17–25. doi: 10.1007/s10584–009–9605–3
Brookner, Jackie. 1992. "The Heart of the Matter." *Art Journal* 51(2): 8–11.
Bunting, Madeleine. 2009a. "Can an Artist's Wheat Field in Hackney Switch the Mood on Climate Change?" *The Guardian,* July 12. www.guardian.co.uk/commentisfree/2009/jul/12/climate-change-art-food/print
Bunting, Madeleine. 2009b. "The Rise of Climate-Change Art." *The Guardian,* December 2. www.guardian.co.uk/artanddesign/2009/dec/02/climate-change-art-earth-rethink
Bunting, Madeleine. 2010. "Art and Climate: Does the Art Stop when the Persuasion Starts?" *RSA Art and Ecology,* March 29. www.artsandecology.org.uk/magazine/features/madeleine-bunting
Crang, Mike. 2003. "On Display: The Poetics, Politics and Interpretation of Exhibitions." In *Cultural geography in practice,* edited by Alison Blunt, et al., 255–268. London: Arnold.
Demos, T. J. 2009. "The Politics of Sustainability: Art and Ecology." *Radical Nature: Art and Architecture for a Changing Planet 1969–2000,* 17–30. London: Koenig Books.
Dessler, Andrew and Edward A. Parson 2010. *The Science and Politics of Global Climate Chage: A Guide to the Debate,* 2nd edition. Cambridge: Cambridge University Press.
Doyle, Julie. 2011. *Mediating Climate Change.* Farnham, Surrey: Ashgate.
Duncan, Carol. 1991. "Art Museums and the Ritual of Citizenship." In *Exhibiting Cultures: The Poetics and Politics of Museum Display,* edited by Ivan Karp & Steven D. Lavine, 88–103. Washington, DC: Smithsonian.
Edelman, Murray. 1995. *From Art to Politics: How Artistic Creations Shape Political Conceptions.* London: University of Chicago Press.
Fossil of the Day. 2009. "Canada Shame as Canada Named 'Colossal Fossil,'" December 18. www.fossil-of-the-day.org/?p=266
Grindon, Gavin. 2010. "Art & Activism." *Art Monthly* 333: 9–12.
Hope, Sophie. 2010. "'C Words': A Tissue of Lies?" *Platform: Arts, Activism, Education, Research,* June 2. http://blog.platformlondon.org/2010/06/02/c-words-ripples-continuing/
Hulme, Mike. 2009. *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity.* Cambridge: Cambridge University Press.
Jacobson, Kathleen. 2010. Guided Tour of the *Earth: Art of a Changing World* exhibition at the Royal Academy of Art, London.
Larsen, Lars Bang. 2010. "The Jury Stays Out/Art Activism & Art's New Normativity." *Concept Store* 3: 27–33.
Linkins, Jason. 2010. "Confirmed: Yes Men behind Prank of Canada at COP15." *The Huffington Post,* March 18. www.huffingtonpost.com/2009/12/14/canada-gets-punkd-incope_n_390992.html
Mouffe, Chantal. 2010. "The Museum Revisited." *ArtForum,* Summer, 326–327, 384.
PLATFORM. 2010. "Recuperator/Recuperated 1: Platform." *Concept Store* 3: 17.
PLATFORM.PLATFORM London website. www.platformlondon.org/index.asp
Pluhar, Werner S. 1987. "Translator's Introduction: Judgements About the Sublime." In *Critique of Judgment,* Immanuel Kant (trans. Werner S. Pluhar), xviii–xxi. Indianapolis, Indiana: Hackett.

Roth, Paul. 2010. "Edward Burtynsky: Oil—A Ballardian Interpretation," January 5. www.ballardian.com/edwardburtynsky-oil-aballardian-interpretation

Royal Academy of Art. 2009. *Earth: Art of a Changing World* exhibition website. www.royalacademy.org.uk/exhibitions/gsk-contemporary-season2009/exhibition/

Smith, Terry. 2009. *What is Contemporary Art?* London: The University of Chicago Press.

Thornton, Sarah. 2009. *Seven Days in the Art World*. London: Granta.

Tickell, Alison. 2010. "Introduction." In *Long Horizons*, 3–4. London: British Council.

Trevor, Tom. 2010. "Who's Recuperating Who?" *Concept Store* 3: 10–15.

Zuidervaart, Lambert. 2011. *Art in Public: Politics, Eeconomics, and a Democratic Culture*. Cambridge: Cambridge University Press.

10 Inside and Outside the Tent

Climate Change Politics at the 2009 United Nations Climate Change Conference

Brett Neilson

Without doubt there are aspects of climate change that transcend the realm of human politics. The interaction of glacial and carbon cycles, the previous history of the planet's warming and cooling, the unfolding of the effects of present climate change over a period much longer than usually considered in historical and political terms—all point to processes and timescales that are difficult for humans to visualize or understand. Combined with the recognition that human beings today act as a geophysical force, these considerations suggest a scenario that reaches beyond questions of human justice or experience. The recent work of Dipesh Chakrabarty (2009, 2012) has been exemplary in exploring these dynamics and suggesting why climate politics, whether articulated as policy or in activist registers, seems perpetually to fall short of the challenges it confronts. This chapter is more modest in its aims. It explores a prominent instance of such shortfalling and probes its implications for changing systems of global governance, the cultural politics of climate change and the role of the museum sector in negotiating such governance and politics.

Although one in a series of United Nations Climate Conferences, the fifteenth Conference of the Parties (COP15) to the United Nations Framework Convention on Climate Change (UNFCCC), held in Copenhagen in December 2009, was a watershed event. At stake was the negotiation of a new global agreement on the reduction of greenhouse gas emissions to replace the Kyoto Protocol, the first commitment period of which was due to expire in 2012. The outcome of the Copenhagen conference was a nonbinding "accord" which set two different schedules for reducing emissions: one for developed nations (US, EU, Australia, Canada, New Zealand) and another for developing countries (including fast-developing BASIC countries—Brazil, South Africa, India and China—as well as smaller emitters). This accord was widely recognized as an agreement to disagree. My interest is in the political conflicts and fallouts that led to this less-than-satisfactory result. I trace not only disputes between the parties in the conference (or what I call "inside the tent") but also the discord between these parties and the activist and environmental groups that protested in the streets of Copenhagen ("outside the tent"). Furthermore, I explore political conflicts

between different groups operating "outside the tent" and the overlaps between them and some of the parties active "inside the tent." Finally, I investigate the role of museums in the cultural program of COP15 and suggest that they provide "spaces of conflict" where the discords between disputing parties can be represented and played out. Following the case of a breakdown of relations between an institution participating in the cultural program, the Nikolaj Copenhagen Contemporary Art Centre, and a Bristol-based arts group committed to radical political protest, the Laboratory of the Insurrectionary Imagination, I reflect critically on the significance of COP15 for future museum engagement with climate politics.

A FAILURE OF THE GLOBAL DEMOCRATIC SYSTEM

The global governance of climate change is a complex business. At the Copenhagen conference a wide range of issues were at stake. These are best summarized in the four expectations for the conference articulated by Yvo de Boer, then Executive Secretary of UNFCCC:

1. How much are the industrialized countries willing to reduce their emissions of greenhouse gases?
2. How much are major developing countries, such as China and India, willing to do to limit the growth of their emissions?
3. How is the help needed by developing countries to engage in reducing their emissions and adapting to the impacts of climate change going to be financed?
4. How is that money going to be managed? (COP15 2009)

These questions are framed by an implicit assumption of difference between so-called industrialized and developing countries. Such divisions have been rigorously questioned in the idioms of postcolonial theory and globalization studies, which point to the increasing heterogeneity of global space and the way the concept of development consigns nations to "an imaginary waiting room of history" (Chakrabarty 2000, 8). In the architecture of the UNFCCC, they are formal divisions of governance. The Convention divides countries into Annex I parties and non-Annex I parties. The former are the OECD nations plus so-called Economies in Transition (EIT), the Russian Federation and other Baltic and Central European states. The latter are all other nations, including "groups of developing nations . . . recognized by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought" (UNFCCC 2013). Around this basic division between Annex I and non-Annex I parties turns a further series of distinctions. Annex II countries are the OECD members of Annex

I, which are expected to provide financial assistance to developing and EIT nations to reduce emissions and adapt to the impacts of climate change. There is also a group of non-Annex I parties identified as least developed countries (LDCs), which are given special consideration due to their limited capacity to respond to climate change. The Convention allows for observer organizations to attend the COP and its subsidiary bodies. These include representatives of the UN's secretariat units and specialized agencies as well as a host of intergovernmental and nongovernmental organizations. The division between Annex I and non-Annex I countries remains the main structuring device of the Convention. Not surprisingly, it was around this division that the COP15 negotiations began to unravel when the so-called G-77 developing countries and China staged a five-hour walkout to protest the reluctance of the industrialized nations to adopt and renew the Kyoto Protocol.

This walkout, which occurred on the eighth day of the conference and was led by African delegates, set the circumstances under which the accord that resulted from the conference was negotiated. Brokered between the US, India, South Africa, Brazil and China, this nonbinding agreement aimed to keep global warming at 2°C or less and provide $30 billion to battle climate change by 2012. Deeply disappointing to African and other developing nations who had hoped to limit the global temperature rise to 1.5°C this century, the accord set no targets for reducing emissions, gave no information or guarantee on funding sources, and was recognized but not adopted by the conference delegates. Radoslav Dimitrov, a Bulgarian delegate, describes the scene that unfolded at 2am during the conference's final plenary when seven countries (Tuvalu, Nicaragua, Bolivia, Cuba, Venezuela, Sudan and Pakistan) exercised veto power to block the adoption of the accord:

> The meeting was suspended, everyone rose and 200 people gathered at the center, surrounding delegates from Bolivia and Venezuela who were physically pressed again the wall of the podium. "You will never get the money again!" shouted one Western delegate. (Dimitrov 2010, 20–21)

Despite this pressure the accord was not adopted. The chief negotiator for the G-77 countries, Lumumba Di-Aping of Sudan, described this agreement as having "the lowest level of ambition you can imagine. It's nothing short of climate change skepticism in action. It locks countries into a cycle of poverty forever" (quoted in Vidal, Stratton and Goldenberg 2009). Di-Aping's discontent had also surfaced earlier in the conference, when on the fifth day he confronted and walked out of a meeting with conference chair, Connie Hedegaard, then Danish Minister for Climate and Energy. The accord, however compromised, was welcomed by Hedegaard who, contrary to wide media opinion describing the conference as a failure, was able to present it as "a first step" (quoted in Pawlak 2009). This was convenient for the

Danish minister, who is now the European Climate Commissioner, given the stridency of her rhetoric in the lead up to the event:

> If the whole world comes to Copenhagen and leaves without making the needed political agreement, then I think it's a failure that is not just about climate. Then it's the whole global democratic system not being able to deliver results in one of the defining challenges of our century. And that is and should not be a possibility. It's not an option. (quoted in Von Bulow 2009)

Notable about this statement is the way in which Hedegaard relates the question of climate change to issues of global governance. At stake is "the whole global democratic system"; presumably not only the UN, its conventions and the representative logic that underlies them (nations represent people, delegates represent nations, etc.) but also state systems and non- and intergovernmental organizations that contribute to and surround these institutions and devices of governance. The possibility that this system might fail to deliver a political agreement on climate change is one that Hedegaard recognizes but refuses to countenance. Her statement conveys at once foreboding and intransigence.

Such concerns are not exclusively the province of high ranking politicians. They are also shared by prominent political scientists committed to the ideal of global democracy. David Held and Angus Fane Hervey (2009, 2) explain: "At the global governance level there has so far been a failure to generate a sound and effective international framework for managing global climate change, whilst at state level solutions are weak and struggle to transcend the normal push and pull of partisan politics." Held and Hervey remain confident about the ability of democratic participation and deliberation to confront the problem of climate change, but like Hedegaard they worry that existing systems of global governance are ill-equipped to achieve results. Identifying key players such as the UNFCCC, the Global Environmental Facility, the OECD Environmental Directorate and the WTO Committee on Trade and Environment, they point to an "anarchic inefficiency" at the global level and highlight the importance of the continued role of the state in legislating and supporting technological advance. If there is a failure to meet the challenge of climate change, they suggest, "the structural flaws of democracy could be said to have tragically trumped democratic agency and deliberative capacity" (16). It is worth keeping this anxiety in mind as we move on to consider those who understand their political actions to exist outside and against this same political system.

OUTSIDE THE TENT

The Copenhagen climate change conference was not only a gathering of parties to the UNFCCC and observer organizations. The event also drew

numerous social movements that protested outside the conference, publicized their efforts through various media channels and took the city as a stage on which to make their political points. The relation between movements that acted outside the tent and organizations present inside the tent was often complex and not at all mutually exclusive, especially when one considers the role of observer organizations such as NGOs. At Copenhagen there was an increased presence of such organizations. Over two thirds of the total 20,611 individuals registered to participate were from observer organizations (Fisher 2010). However, the conference venue—the Bella Centre—was able to accommodate only 15,000 people. Consequently, many observers were excluded from the proceedings. This was not an issue during the first week of the conference, as most observers attend only in the second week when ministerial level talks take place. Restrictions on the number of observers allowed into the Bella Centre began on the Tuesday of the second week and registration for observers, which was scheduled to be open throughout the meetings, was permanently closed on the Wednesday morning. This pushed observers closer to the protest events that were unfolding outside the conference. Some observer organizations, including Friends of the Earth International, Avaaz and Tcktcktck, had their accreditation revoked and were excluded altogether from entry. More commonly, observer organizations had only some of their delegates accepted for entry into the conference, and this set up clear lines of communication between inside and outside the tent.

It is worth paying brief attention to the role of observer organizations inside the conference, if only because they provide a vital bridge to those organizations and networks that operate outside the event. Delegates from observer organizations are not normally allowed access to formal negotiations between parties to the convention. However, it is possible for such delegates to also be members of national delegations, and, in any event, members of national delegations also often update observers about the course of negotiations. It is too simple to characterize the conference as divided between the official parties and disenfranchised observer organizations, since, as we have seen, many smaller and developing nations, although officially recognized as parties, are also quite disenfranchised when it comes to influencing outcomes. There is thus a tendency for observer organizations to align themselves with the less influential nations and even to stage protest actions in solidarity with them. Protest is by no means a form of political expression relegated to outside the conference. In the first week of COP15, for instance, a protest was staged inside the Bella Centre in support of Tuvalu, the low-lying Pacific island nation that risks submerging with rising ocean levels. Similarly on the day that the G-77 nations and China walked out of the negotiations, the conference lobby filled up with NGO delegates wearing blue raincoats who chanted "We stand with Africa! Kyoto targets now!"

There is disagreement among commentators about the role of protest organizations outside the tent in influencing the restriction on entry of

observers in the second and crucial week of negotiations. Fisher (2010) suggests that the closing of registration for observer organizations was a reaction to the threat of protesters to storm the Bella Centre and turn it into a people's assembly. McGregor (2011) disagrees with this perspective and emphasizes the continuity between NGO actions and involvement inside and outside the tent. He focuses on the role of three environmental and climate justice groups—Climate Action Network (CAN), Global Climate Change Alliance (GCCA) and 350.org—both in influencing agenda-setting for COP15 and organizing protest events in the lead-up to the conference. Both of these commentators restrict their attention to the NGO sphere or the role of what they call civil society at Copenhagen. They pay little attention to the actual organization of groups that operated outside the tent or the alliances between them. For instance, they do not discuss the Klimaforum09, a parallel event to the executive conference, which was funded by the Danish government and involved the participation of groups such as Friends of the Earth International and 350.org. Nor do they discuss organizations such as Climate Justice Action (CJA) which have a greater commitment to direct action, although Fisher suggests that the strategies of such groups contributed to limit the access of civil society organizations to the conference.

CJA is a network of activist groups and organizations that formed during the mobilization of social movements that led up to the Copenhagen conference. Its website lists some sixty-seven organizations that form part of the network. Significantly this list does not include CAN, GCCA, 350.org or other groups that commentators like McGregor recognize as part of civil society. The website describes the network in the following manner:

> CJA is a transnational non-hierarchical direct action network that serves as a resource base for exchange of experiences and seeks to connect and give visibility to (localised) struggles in order to be a tool for movement building. We consider ourselves part of the broader movements for climate and social justice. Anyone agreeing to and acting in accordance with our aims and principles can be part of the CJA network. CJA commits to having regular electronic and face-to-face organizational and strategy meetings to link our struggles—all are invited to become an active part to the process! (CJA 2013)

The aims and principles to which affiliated organizations must comply are listed as unity, respect and trust. Essentially they stipulate solidarity between the organizations involved, respect for diversity of opinions and tactics, and acceptance that only the network can speak publicly on behalf of the network. Importantly, it was CJA that orchestrated the "Reclaim Power Day" on the second Wednesday of the conference, aiming to break the restricted perimeter around the Bella Centre and to meet dissatisfied delegates leaving the conference in order to state a people's assembly. Although CJA made

clear its commitment to principles of nonviolence, the police made sure such a meeting never occurred. The protest resulted in 230 arrests. The police employed a tactic of mass arrest, which had also been used during a demonstration on the previous Sunday in which 968 people were simultaneously arrested and made to sit in the cold for hours. Although later declared illegal by two Danish courts, the police defended this tactic by claiming that definitive action was required when a small group of protesters began to get out of hand. Whatever the truth behind the decision to close conference registration to observer delegates on "Reclaim Power Day," it seems unlikely that the storming of the venue could have been realistically accomplished.

The emergence of networks like CJA was a significant outcome of the protests in Copenhagen because of the diversity of social movements involved and the way they straddled ecological and anticapitalist groups. Typically, the relations between such groups have been fractious. Although there are many variances and degrees of stringency on either side, the former tend to ascribe to a politics of limits and conservation, sidelining the human for a focus on the earth and the forms of life that interact with it. The latter contend that the climate crisis is a symptom of capitalist development and tend to focus on the open, limitless potentialities of human production. The potential overcoming of this divide through a focus on what these groups hold in common is a crucial matter in social movement politics. As political theorist Michael Hardt wrote in the wake of Copenhagen:

> There was thus clearly potential for conflict in Copenhagen between environmental activists urging a politics of limits (arguing, in essence, "this world is still possible, maybe") and those alter-globalization activists advocating unlimited possibilities (chanting "another world is possible"). But such a conflict did not, in fact, take place. In the end, I suspect that the conceptual dissonance I recognize between limits and limitlessness is really a false problem, and that the movements will show us before long how these are not contradictory positions. (Hardt 2009)

Hardt is right that major conflicts did not emerge around such divergences at Copenhagen. Nonetheless the "conceptual dissonance" he highlights points to the need for continual practical negotiation and maneuvering between differently oriented protest groups. Certainly anticapitalist protesters at Copenhagen expressed their unwillingness to cooperate with NGOs or umbrella organizations like CJA. The German group Never Trust a COP declared: "we will refuse to side with sell-out NGOs and all the would-be managers of protest; we will refuse all governments and governance and not just de-legitimize the present ones" (Never Trust a COP 2009). The potential for conflict outside the tent needs to be understood in the context of the confluences that emerged. These in turn need to be situated with respect to the dynamics of the UN conference as well as the crossovers and contentions that continued to separate official delegates, civil society organizations and

social movements. There are doubtless many instances of such crossover and contention that could be identified. The ones I focus on in the remainder of this chapter concern the cultural program of COP15 and highlight the contested role of museums in climate change negotiations.

RETHINK POLITICS

The official cultural program of COP15 was hosted not by the UN conference but rather by a website titled Wonderful Copenhagen, a tourist portal offering guides to attractions, shopping, dining, transport and accommodation in the city. The events presented in the cultural program took place throughout 2009 in Denmark and the southern part of Sweden. They comprised film screenings, art exhibitions, debate fora, lecture series, artist talks and other public proceedings. The signature event in Copenhagen was an exhibition entitled RETHINK: Contemporary Art and Climate Change. Organized by the Alexandra Institute, a research-based IT services company, RETHINK featured twenty-six international artists and was staged across four different cultural institutions: the National Gallery of Denmark; Den Frie Centre of Contemporary Art; Nikolaj, Copenhagen Contemporary Art Center; and the Moesgård Museum in Aarhus. Each of these tackled a different theme, respectively: RETHINK Relations, RETHINK the Implicit, RETHINK Kakotopia, and RETHINK Information. In addition, a series of online discussions were staged under titles such as RETHINK Politics, RETHINK Borders, RETHINK Nature and RETHINK Social Life. These involved online public debate on relevant essays contributed by influential thinkers such as Bruno Latour, Saskia Sassen and Anthony Giddens. Latour also gave a lecture at the Den Frie Centre of Contemporary Art. A performance of *Sinfonica Antartica,* a musical work by experimental electronic composer and hip-hop artist DJ Spooky (aka Paul Miller), was staged at the National Gallery of Denmark. Funded by the Nordic Cultural Foundation, the Branding Denmark Fund, the City of Copenhagen and the Danish Arts Council, RETHINK was recognized as the Nordic exhibition of the year 2009–2010. Connie Hedegaard, the COP15 chair whose concerns about the global democratic system were discussed earlier, said of the event:

> Art can act as a source of inspiration and initiate reflection. Naturally, I hope some of the many politicians who come to Copenhagen for the climate conference in December will be inspired by the exhibition. However, it is also important that citizens get the opportunity to view the climate challenge from a cultural perspective. (quoted in Maguire 2009)

By far the most-discussed work in the RETHINK exhibition was *Biospheres* by Argentinean artist Tomás Saraceno. The work consisted of a series of transparent globes connected by a web of strings, each containing

a self-regulating ecosystem: some filled with growing plants, others with lichen, others holding liquids and anchoring the structure to the floor, etc. The largest of these globes were suspended delicately in the gallery space and allowed viewers to enter in order to spin around and become part of the process. *Biospheres* displayed a fundamental ambiguity as it was difficult to say whether the work was a dark vision of a world destroyed by climate change or an optimistic symbol of a green future. The work I want to discuss in the remainder of this chapter was intended to be part of an altogether more dystopian exhibition, RETHINK Kakotopia, staged at the Nikolaj Contemporary Art Centre. Kakotopia was the term used by the nineteenth-century English philosopher Jeremy Bentham to describe a negative state of society characterized by chaos and disintegration. The exhibition aimed to consider a future with catastrophic climate change. *Put the Fun between Your Legs* was a work commissioned by the Nikolaj in July 2009 from the UK-based artist group Laboratory of the Insurrectionary Imagination. The group describes itself as an "affinity of friends who recognize the beauty of collective creative disobedience" (LABOFII 2009). The work in question was an "experiment in building tools of civil disobedience," specifically a "pedal powered resistance machine" assembled from discarded bicycles and other devices to be used in street protests. Prototypes had been prepared as part of an exhibition called "C Words," staged at the Arnolfini Gallery in Bristol and discussed by Kellie Payne in this volume. The idea was for these objects to play a role in the Bike Bloc, a fraction assembled to participate in the Reclaim Power demonstration that aimed to establish a People's Assembly in the Bella Centre. That the work never ended up being part of the RETHINK exhibition tells us much about the role of the museum in climate change negotiations (for further reflections on how this case reflects on the relations between activist art and museum practice see Grindon 2010 and Robertson 2011). It is particularly relevant for considering how the museum presents itself a space of conflict where political approaches from inside and outside the tent meet and clash.

The Laboratory of the Insurrectionary Imagination explains the Nikolaj's decision to drop their work from the exhibition in a blog post dated October 7, 2009:

> In July this year, The Laboratory of Insurrectionary Imagination, a UK-based artists' collective (www.labofii.net), was commissioned by the Copenhagen Centre for Contemporary Art (www.kunsthallennikolaj.dk/en) to make a new piece of work for Rethink (www.rethinkclimate.org), an exhibition of "political" art during the December UN climate change summit. On Wednesday last week the gallery pulled out claiming it could no longer continue to support the project for "practical reasons." In fact they were frightened that the project involved non-violent civil disobedience and that this might be disapproved of by their funders. (LABOFII 2009)

The artist group goes on to publish an email sent to them by Elisabeth Delin Hansen, the director of the Nikolaj since 1993 and curator of the Kakotopia exhibit. The website Art and Audiences describes Hansen as having curated a large number of shows dealing with "political, social or feminist issues." It also explains that she is responsible for the Nikolaj developing a profile that invites the "audience into dialogue" and goes "outside the walls of the institution, both classical outreach projects and more untraditional artists' approaches" (Art and Audiences 2008). Despite these credentials, Hansen's email suggests she has had difficulty negotiating the "untraditional" approach of Laboratory of the Insurrectionary Imagination. According to her, the decision to drop the work is a result of not wanting to constrain artists' creativity with contractual obligations.

> A contract that could really reassure Nikolaj would make it very difficult to work with for you. You would have to find ways to evade the contract, and I would feel very uncomfortable about that . . . I'm very sorry to have "wasted" your time on this negotiation process. I wanted very much to include your work in the exhibition and I hoped to find a solution, but as I said above last evening it became obvious to me that it was without sense. I don't think your project should be limited and cut in every way to fit into a contract. It was like cutting a big colourful bird to fit into a small grey cave. (Hansen quoted in LABOFII 2009)

The reply from Laboratory of the Insurrectionary Imagination, also posted on their website, is damning. Importantly, it comments upon the role of institutions and museums in political life.

> I don't think we should ignore the fact that this is a form of aesthetic censorship, that in the end the world of art is compromising our autonomy and creativity. Art is a free space as long as it doesn't push the laws of the real world, as long as it's set in the safety of the purely conceptual imagined gesture. I think it would be sad for us to leave this debate somehow private and in the shadows, for I think it is key to the whole concept of your show. Standing on the edges of kakotopia we need to redefine the role of art in social change, we need to question the role of institutions and museums, the needs for courage and stepping out of line, the fact that there is no neutrality we are all taking sides. (LABOFII 2009)

As it turned out, Laboratory of the Insurrectionary Imagination found an alternative base for their activities at the Candy Factory, an autonomously run space for artists and activists. Here they welded discarded bikes into contraptions that they called Double Double Troubles (DDTs), practiced protest maneuvers and prepared a "sound swarm" by outfitting bikes with sound equipment. On the day of the protest they participated by making

bike barricades to protect protesters trying to breach the UN security perimeter, conducting swarms to draw police away from the main action, and taking over a motorway. What concerns me is less these actions or their efficacy than how the process of bringing together the work vis-à-vis the relation with the Nikolaj Contemporary Art Centre sheds light on the role of institutions and museums in the wider global governance of climate change.

Clearly the Director of the Nikolaj was caught in a situation in which she wished to encourage radical participatory art of the type pursued by Laboratory of the Insurrectionary Imagination but ultimately unable to commission such work under the contractory arrangements entailed by the RETHINK exhibition's role in the COP15 climate program. At stake is an instance in which the line between inside and outside the tent is starkly drawn. It is tempting to draw a parallel between Hansen's decision to exclude these artists from the RETHINK Öotopia exhibition and the role of the police in controlling the security line between the Bella Centre and the demonstrators on the day of the protest. Regardless of the terms on which NGOs manage their operations on either side of this line, the museum is positioned in a way that it must decide under constrained conditions. Its opening to groups like Laboratory of the Insurrectionary Imagination, whose artistic activities mesh with civil disobedience, remain contested and so, to this extent, museums cannot provide a neutral space from which to negotiate climate change debates or provide authoritative information about them. Viewing the museum as a space of conflict allows an approach that takes seriously the discord that surrounds its operations and recognizes how the dynamics of global governance penetrate its walls. Neither a "grey cave" nor a site of enlightenment, the museum remains enmeshed in the networks and conflicts of governance it seeks to represent and elude.

CONCLUSION

I take the term "spaces of conflict" from an exhibition curated by Nina Möntmann and staged at the Nordic Institute for Contemporary Art in 2004. The exhibition consisted of an audiovisual presentation put together by artists Mike Bode and Steffan Schmidt based on interviews and close collaboration between directors and curators of seven international institutions in Berlin, Oslo, Copenhagen, Vilnius, Malmö and Helsinki. It explored the potentialities of the curatorial tradition known as "new institutionalism," which aims to involve multiple communities in the process of staging exhibitions. This approach, which Kellie Payne (in this volume) identifies with the curatorial methods of the Arnolfini gallery (which provided the Laboratory of the Insurrectionary Imagination with the opportunity to build their prototypes), chimes with Hansen's work at the Nikolaj in bringing audiences into dialogue with the museum and getting outside the walls of the institution. Significantly, in a 2009 article, Möntmann decries the fact that the institutions

involved in the project have entered "a period of profound change that demands a radical change of political course" (156). She quotes artist Hito Steyerl who writes: "is it not rather absurd to argue that something like an institution of critique exists, at a time when critical cultural institutions are clearly being dismantled, underfunded, and subjected to the demands of a neoliberal event economy" (Möntmann 2009, 157). Hansen's decision possibly reflects similar changes and pressures but the fact that it occurs in the midst of the UN climate change conference connects it to wider dynamics of global governance that exceed the sphere of cultural institutions as such.

At stake in this chapter has been the way the question of governance crosses the line that separates subjects and organizations that act inside and outside the tent in contemporary climate change negotiations. There are on either side declarations of ungovernability, whether it be from sovereign states that seek to call their own shots on climate change outside mechanisms of the UNFCCC or from activist groups like Never Trust a COP, who proclaim their refusal of all "governments and governance." For most entities who fall between these extremes, including those disenfranchised nation-states unhappy with the Copenhagen accord and NGOs and activist organizations that negotiate the line between inside and outside the tent, it is less a matter of not being governed at all as one of "not being governed like that"—to recall a famous phrase from Foucault's essay "What Is Critique?" (Foucault 1997). This implies a move, as Gerald Raunig (2009, 4) puts it, from "a phantom battle for a *big other* to a constant struggle in the plane of immanence, which—as I would like to add—is not (solely) actualized as a fundamental critique of institutions, but rather as a permanent process of instituting." Museums, as I have hoped to show, are not alone in this politics of instituting or on this plane of immanence. Indeed, I think it would be disingenuous to claim that they hold a special position in such struggles or one that is somehow immune from the play of power or corruption by dint of the patina of public authority. The instance of the Nikolaj Contemporary Art Centre refusing the participation of the Laboratory of the Insurrectionary Imagination in its part of the RETHINK exhibition is testament to this. I do not wish to imply judgment or calumny, although I also believe it is irresponsible to subtract individuals or institutions from responsibility. Climate change is a genuinely complex issue and its governance, if we are to believe Chakrabarty (2009), exceeds the current registers of both formal and activist politics. It is not simply a matter of making policies or international agreements, even if the lack or avoidance of these is telling and indeed indicative of a failure of global democratic systems. The possibility of finding a path between what Hardt (2009) calls a politics of limits based in ecological tenets and a politics of limitlessness that appeals to human productivity cannot easily be mapped across the line separating the inside and outside of the tent. Museums, in this context, must be recognized as fallen institutions, as much as parliaments, the United Nations, NGOs or activist organizations. It is best not to expect too much of them, lest they disappoint us.

REFERENCES

Art and Audiences. 2008. Elisabeth Delin-Hansen. http://artsandaudiences.com/2013/elisabeth-delin-hansen/

CJA (Climate Justice Action). 2013.

COP15. 2009. http://en.cop15.dk/news/view+news?newsid=876

Chakrabarty, Dipesh. 2000. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton, NJ: Princeton University Press.

Chakrabarty, Dipesh. 2009. "The Climate of History: Four Theses." *Critical Inquiry* 35(2): 197–222.

Chakrabarty, Dipesh. 2012. "Postcolonial Studies and the Challenge of Climate Change." *New Literary History* 43(1): 1–18.

Dimitrov, Radoslav S. 2010. "Inside Copenhagen: The State of Climate Governance." *Global Environmental Politics* 10(2): 18–24.

Hardt, Michael. 2009. "Michael Hardt on the Common in Copenhagen." *Harvard University Press Blog*, December 21. http://harvardpress.typepad.com/hup_publicity/2009/12/michael-hardt-on-the-common-in-copenhagen.html

Held, David and Angus Fane Hervey. 2009. "Democracy, Climate Change and Global Governance: Democratic Agency and the Policy Menu Ahead." *Policy Network Paper*. www.policy-network.net/publications_download.aspx?ID=3426

Fisher, Dana R. 2010. "COP-15 in Copenhagen: How the Merging of Movements Left Civil Society Out in the Cold." *Global Environmental Politics* 10(2): 11–17.

Foucault, Michel. 1997. "What Is Critique?" In *The Politics of Truth: Michel Foucault*, edited by Sylvére Lotringer and Lysa Hochroc. 23–82. New York: Semiotext(e).

Grindon, Gavin. 2010. "Art & Activism." *Art Monthly* 333: 9–12.

LABOFII (Laboratory of the Insurrectionary Imagination). 2009. www.labofii.net/

McGregor, Ian M. 2011. "Disenfranchisement of Countries and Civil Society at COP-15 in Copenhagen." *Global Environmental Politics* 11(1): 1–7.

Maguire, Rob. 2009. "Rethink: Contemporary Art and Climate Change." *Art Threat*, December 6. http://artthreat.net/2009/12/rethink-art-climate-change/

Möntmann, Nina. 2009. "The Rise and Fall of New Institutionalism: Perspectives on a Possible Future." In *Art and Contemporary Critical Practice: Reinventing Institutional Critique*, edited by Gerald Raunig and Gene Ray. 155–160. London: May Fly Books.

Never Trust a COP. 2009. www.nevertrustacop.org

Pawlak, Justyna. 2009. "EU Calls for more US Involvement in Climate Works." *Reuters*, December 22. www.reuters.com/article/2009/12/22/us-climate-eu-copenhagen-idUSTRE5BL21F20091222

Raunig, Gerald. 2009. "Instituent Practices: Fleeing, Instituting, Transforming." In *Art and Contemporary Critical Practice: Reinventing Institutional Critique*, edited by Gerald Raunig and Gene Ray. 3–12. London: May Fly Books.

Robertson, Kristy. 2011. "Capitalist Cocktails and Moscow Mules: The Art World and Alter-globalization Protest." *Globalizations* 8(4): 473–486.

UNFCCC. 2013. http://unfccc.int/parties_and_observers/items/2704.php

Vidal, John, Allegra Stratton and Suzanne Goldenberg. 2009. "Low Targets, Goals Dropped: Copenhagen Ends in Failure." *The Guardian*, December 19. www.theguardian.com/environment/2009/dec/18/copenhagen-deal

Von Bulow, Michael. 2009. "Failure in Copenhagen is Not an Option." *Denmark*. http://en.cop15.dk/news/view+news?newsid=2257

11 What Color Is Citizenship?

Toby Miller, Richard Maxwell and George Yúdice

What color is citizenship? Anyone trying to make sense of the mad claim that Britain exemplified nineteenth-century liberal ideals when it specialized at that very moment in imperialism, or that Jefferson was a great democratic theorist and activist at the same time as he owned people. Those issues continue to resonate today, as constitutions wrestle with indigenous and immigrant peoples' rights, whether they are minorities or majorities.

The color we're referring to here is not, however, primarily to do with race, although such identities factor into it in important ways.1 The color is green (i.e., ecological, environmental or green citizenship). What *does* that modifier mean?

GREEN

In the contemporary world, citizenship is difficult, if not impossible, to describe without reference to its seeming antinomy of consumption. Citizens and consumers shadow each other—*national* subjects versus *rational* ones, altruists versus monads. Under neoliberalism, politics has become artificial and consumption natural, a better means of legitimizing social arrangements.

Adopting the tenets of consumers, citizens are desirous, self-actualizing subjects who conform to general patterns of *controlled* behavior. Adopting the tenets of citizens, consumers are self-limiting, self-controlling subjects who conform to general patterns of *purchasing* behavior. Sometimes, both sides fail to see what is "good" for them (as when citizens resist financial globalization, or consumers borrow ill-advisedly).

In ecological and democratic terms, such tendencies lead to plutocratic arrangements—for example, if green activism is ordered around consumption, those who do not consume, or barely do so, are *ipso facto* excluded from the exercise of power in the same way as they are marginal to decisions made by the International Monetary Fund (IMF) or the World Bank, where voting is decided by financial contribution. And ontologically, we must reject the timeless, spaceless, subject-free monadic selfishness envisioned in

defining works such as the "Tragedy of the Commons" (Hardin 1968). The evidence does not support its powerful conceits of corporate beneficence and consumer selflessness as solutions to environmental despoliation (Humphreys 2009; Seyfang 2005).

Where and how did such bizarre attitudes find a home in the first place? Prior to emerging from this definitional detour onto the floor of the museum, some excavation is necessary if we are to find our way through its labyrinths. We shall see that both untrammeled consumption and unfettered "progress" have been undermined and buttressed by established and emergent philosophical attitudes toward nature and citizenship. Following those remarks, we'll examine some foundational myths of natural history museums and the way that contemporary polluters seek social licenses to operate through their association with art museums.

Humanity is seen by many in philosophy as a "rapacious race, more brutal than any previous beasts of prey; he [*sic*] preserves himself at the expense of the rest of nature, since he is so poorly outfitted by nature in many respects" and must survive through violence (Horkheimer 1996, 32). Hobbes argues that as part of "the war of all against all," it is right for people to domesticate or destroy nature (1998, 105–106), their brute state legitimized via the physiocratic transformation or destruction of subjects and objects.

Hegel maintains that a person can put his or her "will into everything." An object or place thereby "becomes *mine*" because humanity "has the right of absolute proprietorship." People are unique in their desire and capacity to conserve objects and represent them in museums, and a strange dialectical process affords them a special right to destroy as well. Willpower is independent of simple survival, setting people apart from other living things. Semiotic production confers the right to brutal destruction, and "[s]acred respect for . . . unused land cannot be guaranteed" (1954, 242–243, 248–250). The relationship between humans and nature is a struggle for people to achieve freedom from risk and want. Nature's "tedious chronicle," where "nothing [is] new under the sun," is rightly disrespected and disobeyed by the progress that comes with human domination (1988, 61, 154). The capacity to restrain oneself and master one's "spontaneity and natural constitution" distinguishes us from animals (1988, 50).

Such arguments also work with more applied philosophizing: the industrialist Henry Ford argues that "unused forces of nature" must be "put into action . . . to make them mankind's slaves" (1929, 71), while Vannevar Bush, US Director of the Office of Scientific Research and Development during World War II, celebrates the drive to release humanity "from the bondage of bare existence" (1945).

Museums essentially stand in for humans in this schema. Towering entities, they conserve naturally occurring objects and creatures outside their original environments, reconstructing them as memorabilia in a superior being's cabinet of treasures that classifies and orders objects as a means of

putting their domination on display. Hence the anti-indigenous, anti-flora, anti-fauna doctrine of *terra nullius* (www.migrationheritage.nsw.gov.au/exhibition/objectsthroughtime/bourketerra/).

But does this opposition of semiotic richness versus natural primitiveness work? Simmel thinks not:

> When we designate a part of reality as nature, we mean one of two things . . . an inner quality marking it off from art and artifice, from something intellectual or historical. Or . . . a representation and symbol of that wholeness of Being whose flux is audible within them. (2007, 21)

The very concept of nature as something to be molded, discarded, or preserved forgets the principles of unity that animate the sign "nature" as an idea and a representation. They have long been touchstones of the philosophy of art and hence, have semiotic and financial value.

Charles Babbage, the mythic founder of programmable computation, noted the partial and ultimately limited ability of humanity to bend and control natural forces without unforeseen consequences:

> The operations of man . . . are diminutive, but energetic during the short period of their existence: whilst those of nature, acting over vast spaces, and unlimited by time, are ever pursuing their silent and resistless career. (1832)

Even among reactionary voices, an appreciation of nature and a mistrust of people can lead to more careful thinking. Plato refers to the power of natural disasters to destroy social and technological advances as "crafty devices." When "tools [a]re destroyed," this allows room for new inventions and a pacific society that is based on restraint rather than excess (1972, 119–122). Francis Bacon (1620) recognizes that we must "wait upon nature instead of vainly affecting to overrule her." Edmund Burke's cautionary words against the popular will and democracy's presentism endorse a rule of law that acknowledges each generation as "temporary possessors and life-renters" of the natural and social world. People must maintain "chain and continuity" rather than act ephemerally as if they were "flies of a summer," thus ensuring "a partnership not only between those who are living, but between those who are living, those who are dead, and those who are to be born." This will sustain "the great primeval contract of eternal society" (1986, 192–195). Feelings of national patrimony can persuade people to see beyond their consuming desires and consider questions of heritage and legacy, as per citizens who think backwards and forwards rather than just contemporaneously (de-Shalit 2006, 76).

From a more progressive position, David Hume maintains that even if rights are only accorded to those with semiotic abilities, animals deserve them, too, because they "learn many things from experience" and develop "knowledge of the nature of fire, water, earth, stones, heights, depths, etc."

Far than being merely sensate, our fellow creatures infer material truths (1955, 112–113): "the reason of animals" is real (1739).

William Morris's call for the art world to recognize its links to everyday life, as per ethnological museum artifacts, and to problematize Romantic fetishes that separate work from creativity, takes as its lodestone the need to recreate beautiful surroundings as a precondition for beautiful creations:

> Those who are to make beautiful things must live in a beautiful place. Some people may be inclined to say . . . that the very opposition between the serenity and purity of art and the turmoil and squalor of a great modern city stimulates the invention of artists, and produces special life in the art of today. (1884)

In other words, the semiotic marks so prized by Hegel are, ironically, only sustainable in a state of nature—provided that people can "abstain from wilfully destroying that beauty" (Morris 1884).

Nature is simultaneously self-generating and sustaining, yet vulnerable to despoliation. Its reaction to human interference will strike back sooner or later in mutually assured destruction: no more nature, no more humanity, no more art. As a consequence, sacred and secular human norms alike conflict as often as they converge in accounting for changes in the material world and the rights of humanity—its most skillful and willful, productive and destructive inhabitant (Marx 2008). Latour explains:

> From the time the term "politics" was invented, every type of politics has been defined by its relation to nature, whose every feature, property, and function depends on the polemical will to limit, reform, establish, short-circuit, or enlighten public life. (2004, 1)

This necessitates allocating equal and semi-autonomous significance to natural phenomena, social forces, and cultural meaning in order to understand contemporary life. Just as objects of scientific knowledge come to us in hybrid forms that are coevally subject to social power and textual meaning, so the latter two domains are themselves affected by the natural world (Latour 1993, 5–6).

That natural world is always already laden with meaning. Take "green." A disturbingly polysemic word, it can signify displeasure, even disgust. For example, "he turned green" or "it's ludicrous to have green lawns in LA." But the meaning of the term is more complex than that. It is simultaneously serene, beneficial, disturbing, corrupt, radical and conservative: green consumption, green certification, new (green) deal and greenwashing.

In the late 1960s and early '70s, the word "pollution" was in vogue to explain environmental hazards. It was about corporate malfeasance, governmental neglect, and public ignorance, and how to remedy their malign impact. Both a ubiquitous and a local sign, pollution seemed to be

everywhere, yet isolable. The problems it described occurred when particular waterways, neighborhoods or fields suffered negative externalities from mining, farming or manufacturing. The issue was how to restore these places to their prior state: pristine, unspoiled, enduring. Pollution could be cleaned up if governments compelled companies to do so—and would soon be over, once those involved understood the problem.

But when greenhouse gases, environmental racism, global warming and environmental imperialism appeared on the agenda, "pollution" reached beyond national boundaries and became ontological, threatening the very earth that gives and sustains life, and doing so in demographically unequal ways. A word was found to describe the values and forms of life that encompassed a planetary consciousness to counter this disaster, as per the utopias of world government that had animated transnational imaginations for decades: "green" emerged to displace the more negative and limited term "pollution," signifying both new possibilities and a greater and more global sense of urgency.

This beguilingly simple syntagm was thereby quickly transformed into a *mélange*. Today, "green" can refer to local, devolved, non-corporate empowerment, or to international consciousness and institutional action. "Green" environments are variously promoted as exercise incentives (Gladwell et al. 2013), encouragements for consumers to use quick-response codes (Atkinson 2013), ways of studying whether plants communicate through music
AuQ17 (Gagliano 2012), attempts to push criminology toward interrogating planetary harm (Lynch et al. 2013), gimmicks for recruiting desirable employees
AuQ18 (Renwick et al. 2012) and techniques for increasing labor productivity (Woo et al. 2013).

The term is invoked by conservatives, who emphasize maintaining the world for future generations, and radicals, who stress anticapitalist, postcolonial, feminist perspectives. "Green" may highlight the disadvantages of technology, as a primary cause of environmental difficulties, or regard such innovations as future saviors, via devices and processes yet to be invented that will alleviate global warming. It can favor state and international regulation, or be skeptical of public policy. It may encourage individual consumer responsibility, or question localism by contrast with collective action. It both reflects left-right axes of politics and argues that they should be transcended, because neither statism nor individualism can fix the dangers we confront. And "green" is inexorably tied to citizenship, despite the latter's historic roots in artificially delineated space and the former's commitment to planetary norms.

CITIZENSHIP

The last 200 years of modernity have seen the expansion of citizenship—theoretically, geographically and demographically. It occupies three zones,

with partially overlapping and partially distinct historicities. These spheres are the political (conferring the right to reside and vote), the economic (the right to work and prosper) and the cultural (the right to know and speak). They correspond to the French Revolutionary cry "*liberté, égalité, fraternité*" [liberty, equality, solidarity] and the Argentine left's contemporary version "*ser ciudadano, tener trabajo, y ser alfabetizado*" [citizenship, employment, literacy] (Martín-Barbero 2001, 9). The first category concerns political rights; the second, material interests; and the third, cultural representation (Miller 2007). Each one has normally operated within national jurisdictions.

But such boundaries and interests are brought into question by the border-crossing impact of environmental despoliation (Dean 2001). More than an addition to the rights and responsibilities of territorially based citizenship, green citizenship is a critique of them, a corrective that seeks to save infrastructure and heritage from capitalist growth. Bypassing localism and contemporaneity to address universal and future obligations, it transcends conventional political-economic space and time, extending rights beyond the *hic et nunc* in search of a globally sustainable ecology. Green citizenship looks centuries ahead, refusing to discount the health and value of future generations and opposing elemental risks created by capitalist growth in the present (Dobson 2003).

Social movements invoke citizenship against economic imperatives by laying claims to public rights to clean air, soil and water that supersede the private needs of industry; a responsibility for the environment that transcends national boundaries and state interests; and the espousal of intergenerational care rather than discounting the value of future generations (Commission of the European Communities 2008, 31; Dobson 2003).

Because these issues transcend state boundaries, short-term priorities and commercial rents, they must be managed by international organizations, both governmental and not. This is neither new nor dissociated from national citizenship. Away from the utopic hopes of world government on a grand scale, international organizations have been working for a very long time, sometimes quietly and sometimes noisily, to manage particular issues. Seafaring, telecommunications, football, accreditation, Catholicism, postage, airways and athletics all come to mind. Their business is sometimes conducted at a state level, sometimes through civil society and sometimes via both. In almost every case, they encounter or create legal and political instruments that make them accountable to the popular will of sovereign states, at least in name. At the same time, it is clear that national and international organizations and accords have not put a stop to environmental destructiveness (Beck and Grande 2010, 410).

This is a consequence of the hegemony of economic citizenship. The most powerful of the three conventional citizenship discourses, it adds to the burden of environmental costs, because its growth ethic is "hollowed out by a misguided vision of unbounded consumer freedoms" (Jackson 2009).

Environmental disasters are classic instances of economic externalities, i.e. costs that are not borne by the companies and governments that create them (Rosen and Sellers 1999, 585–586).

But while environmentalism may be overdetermined or co-opted by technocratic mandarinism or corporate shill, it remains a key site of change via representative government. This has happened for both good and ill in debates over everything from bald eagles to building codes, albeit rarely representing the interests of birds or land. Even the most neoliberally misinformed trade agreements generally provide for the ultimate political exception to *laissez-faire* exchange between borders—namely, standing armies as entities of the sovereign state—and may exempt environmental matters as well.

Membership of environmental groups tripled in the US between 1980 and 2000. During the same twenty-year period, global adherents to the cause more than doubled. Today, such participation "rivals that of political parties, and exceeds the membership levels of other important civil society sectors" (Dalton 2005, 453–454). These are hopeful signs that the industrial era has been a brief, if traumatic and destructive, moment of mismanaging the Earth that is under heavy assault by half a century of ever-stronger environmentalism.

As green governance introduces aspirations into the global public sphere that counter the environmental despoliation threatening human life, it also confronts risks to nonhuman nature posed by the mounting ecological crisis. This allows mainstream environmentalism to embrace diverse environmental politics—from left eco-centrism and eco-feminism to technocratic, anthropocentric forms that privilege human interests (Groves 1995; Pepper 2000; Swanton 2010, 146). For example, an ethico-political commitment to the Earth and its inhabitants is embodied in Articles 71–74 of the 2008 Ecuadorian Constitution, guaranteeing the rights of nature, or *Pacha Mama,* and the right of citizens to demand that public authorities protect it (Ecuadorian Constitution, 2008).

But mainstream green governance is mostly human-centered, in that it focuses on saving lives, infrastructure, and heritage from environmental risks. This was the framework for sustainable development established by the 1987 World Commission on Environment and Development, which the 1992 Rio Declaration on Environment and Development enshrined as a human right "to a healthy and productive life." It accords equivalent value to economic growth, social progress, ecological survival, and, in more recent interpretations, cultural and informational sustainability.

That necessitates a difficult balancing act. Whereas the interpretation of economic, social, and cultural needs is fraught with conflict and requires negotiations at multiple scales of global governance, the "scientific prerequisites for ecological sustainability" are not a matter of political agreement or "individual values"; "nature does not conduct consensus talks" (Schauer 2003, 3–6).

So what should green citizens do? They must develop an ethical orientation to human relationships with nonhuman nature, drawing on anthropocentric or eco-centric ethics, or a midpoint between them. These schools differ over values (which entities qualify for moral consideration and which matter most) rights (the protection of individual and collective entities) and consequences (utilitarian considerations of actions and motives that affect collective well-being). For anthropocentric eco-ethics, nonhuman nature has no moral standing (and hence no rights) other than in relation to how people are affected by changes in nature. Eco-centric ethics, by contrast, holds that nature is the "ultimate source" of value; "some or all natural beings, in the broadest sense, have independent moral status" (Curry 2006, 64). Intermediate ecological ethics accords intrinsic value to nonhuman nature, albeit not as completely as eco-centrism, though it agrees that moral status can be extended to other sentient beings.

For the moment, we can only imagine a time when green citizens prioritize the Earth. Anthropocentric eco-ethics, which dominates mainstream environmentalism and much state and popular discourse, too, both endorses and attacks consumption. It has the virtue of urging green citizens to buy responsibly and recycle. But it invokes a gendered notion of virtue that favors a hegemonic masculinity of self-reliance, embodies a neoliberal focus on individual responsibility rather than collective and state-based action, and rejects participatory, deliberative democracy in favor of a moralistic and plutocratic republicanism (Arias-Maldonado 2007; Barry 2006; Latta 2007; MacGregor 2006). In a stronger model, Anne Schwenkenbecher argues that "citizens of states which have the power to achieve an efficient climate regime" should comply "with the moral duties they have as inhabitants of high emission countries," not least due to the political power that courses through democracies (2014, 183) (this would not apply, regrettably, in the case of China, the world's largest contemporary polluter).

At a practical level, parts of Latin America have seen the successful mobilization of citizenship rights for ragpickers, denizens of the informal economy who remove and recycle waste: in 2009, Colombia's Constitutional Court ruled that they were entrepreneurs, thus permitting them to tender for waste-management concessions from local government. That decision formalized their status, decriminalized their activities, protected their livelihood from shifts in state policy that had shut down dumps, and offered them franchises if they created conventional firms. Cali-based ragpickers were pioneers in establishing cooperatives, and held the world's first global conference of their colleagues in 2008, including Brazilian ragpickers, whose work is now recognized by the labor ministry (Maxwell and Miller 2012). This represents one of those fascinating transformations of political subjects from social problems to social boons: ragpickers shifted from being regarded as unpleasant, odoriferous embodiments of an abject underclass to model citizens and targets of the contemporary development discourses of microcredit and sustainability.

The Colombian example opens up questions of scale and citizenship. The interdependence of supra-state, inter-state and state governance over environmental matters can be found in numerous policies, laws and agreements. The state must create conditions for decentralized green governance so that small-scale institutions can autonomously design and monitor sustainable practices, particularly where governmental oversight and management are neither feasible nor efficient. Well-organized local institutions have greater success managing resources when external laws provide for their autonomy ("involving users in their choice of regulations so that these are perceived to be legitimate") and political-economic arrangements encourage organizational relationships between enterprises and communities that share ecosystems. Relationships focused on ecologically sound resource management should involve users across ecosystems, monitoring what works and what doesn't, eliminating harmful waste, modifying methods of resource acquisition and sharing information (Ostrom 2000, 47).

There are several standard ways of regulating multinational corporations and the trans-territorial challenges they pose for citizen action: "soft law [protocols of international organizations], hard law [nationally based legislation], codes of conduct [transnational norms] and voluntary self-regulation." The latest critical research suggests that these strategies have not secured a nexus between "the transfer of technology" and the transfer of "practices for using it safely" (Baram 2009). That would necessitate universal standards of health and safety and ecology across sites, from the post-industrial core to the manufacturing periphery, in addition to contractual deals between multinationals and their hosts (Maxwell and Miller 2012).

This does not mean giving all power to the center, but coordination across both natural and human-made frontiers is vital. Research on "enclave deliberation among the disempowered" provides further evidence that decentralized, participatory governance can play a vital role in policy making by involving community members, resource users, experts and elites (Karpowitz et al. 2009, 584). Such models transcend the neoliberal policy framework that has dominated the ideology of growth for three decades, recognizing instead that rational outcomes may derive from stakeholder approaches to managing the commons.

MUSEUMS

Citizenship and environmentalism are central to the heritage of museums. The nineteenth century saw public art museums proliferate as agents of civilizing discipline. They embodied a shift of focus away from the intramural world of the princely museum. Prior to the Enlightenment, royal collections were designed to express monarchical grandeur and induce insignificance in viewers. But the public site of modernity called for identification via a

mutual, municipal ownership that hailed visitors as participants in the collective exercise of power (Bennett 1995, 166). The idea was to produce "symbolic expressions capable of unifying a nation's regions and classes, to give order to the continuity between past and present, between one's own and the foreign" (García Canclini 1995, 116).

This openness has developed over time. We see "warehouses of the past" transmogrified via their "insertion in cultural centers [and the] creation of ecomuseums, community, school, and on-site museums" (García Canclini 1995, 116). The United States has over 8,000 museums, half of which have emerged over the past four decades (Cherbo and Wyszomirski 2000, 6). The number of visitors reached 50 million in 1962 and exceeded the overall population of 250 million by 1980 (García Canclini 1995, 115).

Many museums that focus on nature are tightly encased within imperial domination and industrialization as much as scientific knowledge, and just as tightly linked to the Global North's tendency to colonize and classify peoples and places. A hundred million objects housed in British museums fall into this category (Alberti 2008, 73; Barrett and McManus 2007). Such institutions both record and incarnate imperial knowledge (can it be called wisdom in any sense?). They celebrate history from a frequently pale, male, military, governmental perspective, as per Western Australia's Fremantle Prison Museum (Miller 1998). Science museums express the doctrine of progress as their *nostrum,* with a sometimes gentle, sometimes forceful teleology unfurled to explain research and technology as human triumphs. This fits the perspectives of political and economic citizenship, as the examples below illustrate.

Carlos IV, the ruler of New Spain (later Mexico) established Latin America's first Museum of Natural History in 1790 to display the latest scientific technology. It served not only the purposes of the crown, but also the desire of creoles to refute their disparagement by self-aggrandizing Europeans. After Latin America's independence, its newly formed states invited scientists to "discover" hitherto "unknown" realities. Unlike the missionary work of the Church in the sixteenth and seventeenth centuries, these scientific missions did not aim to convert native peoples. Instead, they showcased Indians as part of history, although artifacts of indigenous culture that could not be assimilated to ideas of grand civilization were closeted (a statue of the Aztec goddess Coatlicue was deemed unworthy of comparison with Greek and Roman statuary). Nevertheless, to the degree that the objects selected for display gave the region a sense of history, they satisfied creole pride and legitimized the state. Moreover, scientific missions produced new knowledge and understanding, consistent with Enlightenment ideas, of this different world, and mapped hitherto unknown resources that might fuel an industrial revolution, charting new routes for extraction and trade.

Argentina's Museo de Ciencias Naturales de La Plata (www.museo.fcnym.unlp.edu.ar/) the continent's most important natural history museum, was developed in the 1880s. It sought to differentiate a modern,

immigrant-descended population from Native Indian landowners. Francisco P. Moreno, the Museo's founder, reconstructed Darwin's trip to Patagonia to gather most of the objects that became its contents. Moreno drew on the voyage of Darwin's *Beagle* as a model for bringing order to a still fragmented nation, folding Patagonia into Argentina. This incorporation coincided with Argentine president Julio A. Roca undertaking the "Conquest of the Desert." As Indians were decimated, Moreno reestablished a place for them in his museum as relics of the power of nature, reminders of the corrupting effects that civilization had on indigenous peoples. Moreno literally housed Patagonian Indians taken prisoner during the conquest in the Buenos Aires Museum of Anthropology, giving "civilized" city dwellers a window into "humanity in its infancy stage" (quoted in Miller and Yúdice 2004, 110). When one of his Indian guides was killed by "wild" Indians, Moreno had the body exhumed, stuffed, and exhibited in the Museo. The conquest of the wilderness (and the Indians) went hand-in-hand with the nationalization of Patagonia and its incarnation in Moreno's museum, transformed into an act of sovereignty. One is reminded here of Theodore Roosevelt's invocation of the sovereign power of nature once it (i.e., the indigenous population) has been conquered; and Moreno was Roosevelt's host and guide when the latter traveled to Patagonia (Miller and Yúdice 2004).

As Néstor García Canclini notes, "[t]o enter a museum is not simply to go into a building and look at works; rather, it is a ritualized system of social action" (1995, 115). That process of interpellation follows a fairly standard format. First, implied visitors are given a perspective on the site's history and their place in it. And second—here, of course, is the rub, and the place where history and its public munificence really commence—a prior age is made known. For that past is compared, often unfavorably, with the moment when history is written—now. The past represents a transcended and either admirable or regrettable heritage. We can learn from it, but it is definitely over. Visitors are expected to understand that we now live in a better—or at least more knowledgeable—moment. This understanding activates cultural citizenship in reaction to the past, whose commemoration in museum form is a strictly delimited ethical zone, a space that divides worthy from unworthy conduct. Tony Bennett's discussion of punishment instruments turns on the emergence of this ethical zone of the cultural citizen, which sifts out the good, the bad and the sublime in past treatment of the population, noting discontinuities and linearities in a movement toward present, "enlightened," standards (1995).

This style of historical narrative is teleological, with the latest epoch always the most advanced. Successive French *coups* after 1789 saw the Musée du Louvre (www.louvre.fr/en) provided with at least one additional ceiling with each change of regime. These renovations explained past glories as precursors and revised previous rulers' accounts of themselves. In 1793, the revolutionary state nationalized the royal art collection to create the Louvre as a space for public appreciation of the building, the work it

housed, and the polity that made it available to all. What had been a private site for generating regal grandeur and differentiation was turned into a public site for displaying the munificence of the people's government. Signifiers of luxury and aristocratic status became signifiers of a national *Geist* that privileged collective heritage over aristocratic power (Duncan 1995, 22, 27, 29).

The Louvre served as a model for the rest of Western Europe, but not in a truly democratic way. By the end of the nineteenth century, the region had created public art museums as "signs of politically virtuous states." A series of American cities (Lima, Boston, Rio de Janeiro, Cleveland, New York, Chicago, Buenos Aires and Mexico City) followed suit. The Pennsylvania Museum was founded to embody the wisdom of the following precept: "to rob . . . people of the things of the spirit and to supply them with higher wages as a substitute is not good economics, good patriotism, or good policy" (quoted in Fraser 2001, 393). When the British Parliament first debated public art museums, discussion centered on how to prepare the people to appreciate the grandeur of art. An imposing architecture was deemed the best method of instilling awe (Duncan 1995, 11, 21, 32). This kind of fealty to the past, and hence to the nation, maps onto contemporary attempts by environmental criminals (Lynch et al. 2013) to cleave legitimacy to their activities, as we shall see.

Two relatively discrete political rationalities inform museums. The first governs legislative and rhetorical forms. The second determines the internal dynamics of a pedagogic site. Certain difficulties emerge from the different dictates of these rationalities. Museums use democratic rhetoric associated with access, an open space for public debate occasioned by the selection, arrangement and narrativization of artifacts. But as pedagogic sites, they function in disciplinary ways to forge public manners. A contradiction ensues between ideology and control and reciprocity and imposition, such that an opportunity for the public to deliberate on some aspect of cultural history is opposed to an opportunity for museum magisters to give courses of instruction to ethically incomplete citizens.

This binary can be subtler than a very general account suggests. Consider the varied histories that underpin Holocaust memorials in the United States (www.ushmm.org/): to recall the dead, to remember the self as survivor or liberator, to constitute the US as the preserve of freedom *par excellence*, to draw tourists, to be a community center, to stress religious or ideological affiliations, and to obtain votes. And museums may equally provide the preconditions for such institutions as Toronto's artist-run Whippersnapper Gallery, featuring Brazilian street artists who create gigantic urban sculptures from garbage (http://vimeo.com/26902572), or protest movements mounting institutional critiques of sponsorship and management (Bain and McLean 2013, 107; Fraser 2001; Lam et al. 2013). This is more progressive cultural citizenship. The Musée du Quai Branly in Paris (www.quaibranly.fr/en/) is a global indigenous people's museum that seeks to represent the

cultural labor of First Peoples respectfully and in a living way. Washington, DC's National Museum of the American Indian (http://nmai.si.edu/) uses the internet to permit long-distance vigilance and visits by native peoples. This newer, critical citizenship can also be stimulated by environmental art and ecocritical art history and theory (Braddock 2009; Cameron et al. 2013; Thornes 2008). And it can confront an agile exploitation of museums' openness by cynically exploitative oligarchs.

THE SOCIAL LICENSE TO OPERATE

The massive, conflictual expansion in meaning of the term "green" that we noted earlier has generated a wide array of instrumental and institutional uses, many of which are relevant to museums. "Green = good" provides an incentive for museums that need dollars to work with polluters who need makeovers. Big polluters make cynical use of these institutions to improve their public image, seeking "a social license to operate" (Socialicense.com, n.d.) through links with allegedly benign entities (art and heritage) that look far-removed from their own core business—and may even be mildly critical of them. This surprisingly overt term has been adopted with relish by corporations to describe their diplomacy with local, national and international communities, undertaken by sponsoring truth and beauty (Prno and Slocombe 2012; "Special Issue" 2006; Thomson and Boutilier 2011). The International Energy Agency numbers the social license to operate among its ominously titled *Golden Rules for a Golden Age of Gas* (2012), while *Forbes* magazine predicted that 2013 would be *the* year for such virtual acquisitions (Klein 2012).

A classic example is BP. Consider the ideological work it does at Britain's Science Museum, where school pupils are urged, in the words of the corporation's magazine, "to explore and understand how energy powers every aspect of their lives and to question how to meet the planet's growing demands in the future." A "partnership" between the two virtuous institutions is obvious given their "shared concern over the public lack of awareness of energy-related issues." The initiative features "an interactive game where visitors play the energy minister and have to efficiently power a make-believe country by balancing economic, environmental and political concerns before the prime minister fires them" (Viney 2010).

This is a clear challenge to environmental science rather than an invitation to dialogue. It positions the firm as a benign intermediary between present and future, science and childhood, truth and innovation—not as one of the worst polluters in history. The game sets up BP and the Science Museum as reasonable people in a world of extremes, capable of a measured and fair-minded engagement with the central issues of sustainability by contrast with hotheaded, green-gaseous, environmentalists. For those on the left, this is a prime instance of greenwashing, a cynical means of deceiving the public.

Vibrant social movements stand against such activities, for example the "Greenwash Guerrillas" (n.d.). They engage the contradictions of cultural institutions that claim to be conservatories animated by green policies, but which rush like orgasmic teenagers towards nocturnal pollution if sponsorship from big oil awaits ("Activistas y artistas" 2010; Lam et al. 2013; Liberate Tate 2014). We might also consider such counter-projects as Platform's Carbonweb (n.d.), which are akin to the institutional critiques of the 1990s in their outsider/insider status—artists who prize museums also criticizing them (Fraser 2001).

When we ponder such uses of green spectacle, it's easy to fall into either a critical camp or a celebratory one. The critical camp would say that rationality must be appealed to in discussions of climate change, and competition for emotion will ultimately fail. Why? The silent majority doesn't like direct action, corporations outspend activists, such occasions preach to a light-skinned, middle-class eco-choir, media coverage is inevitably partial and hostile and crucial decisions are made by elites, not in streets.

Conversely, the celebratory camp would argue that a Cartesian distinction between hearts and minds is not sustainable, a sense of humor is crucial in order to avoid the image of environmentalists as finger-wagging scolds, corporate capital must be opposed in public, the media's need for vibrant textuality can be twinned with serious discussion as a means of involving people who are not conventional activists and a wave of anti-elite sentiment is cresting.

Absent external evaluation of the social composition of activists, the nature of old, middle-aged and new media coverage, and subsequent shifts in public opinion and reactions from lawmakers, it's difficult to be sure about the impact of radically green spectacles. We generally incline toward the skeptic's view of such populist activism—that it's mildly amusing and disruptive, but is basically pranks without proof.

But we don't feel that way in these instances, because the lugubrious hyper-rationality associated with environmentalism needs leavening through sophisticated, entertaining, participatory spectacle. As per Latour's example, green politics must focus on the material, textual and social spheres, and do so blending science and feeling, rigor and play. Otherwise:

> in the name of indisputable facts portraying a bleak future for the human race, Green politics has succeeded in depoliticizing political passions to the point of leaving citizens nothing but gloomy asceticism, a terror for trespassing over Nature and a diffidence toward industry, innovation, technology, and science. Everything happens as if Green politics had frozen politics solid. (Latour 2008, 17)

A blend of dark irony, rich sarcasm and cartoonish stereotypes can mock the pretensions of high art's dalliance with high polluters. Crucially, citizenship must be activated in terms of past, present and future, and not in standard museological ways.

CONCLUSION

As noted earlier, "green" has become maddeningly over-present in our lives. It does *such* contradictory work that motor-racing mavens and messianic eco-martyrs alike invoke the term with equal credibility. This is some measure of both the crisis to which the word refers, and the variety of responses it connotes. We hope that folks who shop via quick-response codes, or visit exhibitions underwritten by polluters, take a critical view of "green" that is alert to its co-optation as well as its value. And that radical users of the concept are as alive to the need for research to test the efficacy of their play as they are to satisfying the desire to act out in public.

The most abiding legacy of green politics and theory must be the development and installation of the Precautionary Principle (n.d.) into museum life and policy making. That principle is opposed to conventional cost-benefit analysis, which looks at the pluses and minuses of consumer satisfaction versus safety. Instead, it places the burden of proof onto proponents of industrial processes to show they are environmentally safe, the idea being to avoid harm rather than deal with risks once they are already in motion: prevention, not cure.

That precept can have meaning for people across multiple subject positions, for they may be simultaneously workers, consumers and citizens. That multi-perspectivism can come from an expansive, integrated citizenship, as per Marcuse's signal recognition that

> the demands of ever more intense exploitation come into conflict with nature itself, since nature is the source and locus of the life-instincts which struggle against the instincts of aggression and destruction. And the demands of exploitation progressively reduce and exhaust resources: the more capitalist productivity increases, the more destructive it becomes. This is one sign of the internal contradictions of capitalism. . . .
>
> [Nature] is a dimension *beyond* labor, a symbol of beauty, of tranquility, of a nonrepressive order. Thanks to these values, nature was the very negation of the market society. (1972)

Citizenship needs to become very green, very quickly. Museums can both reflect and induce that development, provided that they attend to their complicity with polluters and make natural history into a natural present and future.

NOTE

1. African American environmental theorization and activism goes back centuries (Smith, 2007), while environmental racism is a key issue (Cole and Foster, 2001).

REFERENCES

"Activistas y artistas critican la relacion de centros culturales ingleses con la petrolera BP." 2010, January 7. *terc3ra* www.tercerainformacion.es/spip.php?article16502

Alberti, Samuel J.M.M. 2008. "Constructing Nature Behind Glass." *Museum and Society* 6(2): 73–97.

Arias-Maldonado, Manuel. 2007. "An Imaginary Solution? The Green Defence of Deliberative Democracy." *Environmental Values* 16(2): 233–252.

Atkinson, Lucy. 2013. "Smart Shoppers? Using QR Codes and 'Green' Smartphone Apps to Mobilize Sustainable Consumption in the Retail Environment." *International Journal of Consumer Studies* 37(4): 387–393.

Babbage, Charles. 1832. *On the Economy of Machinery and Manufactures*. www.gutenberg.org/ebooks/4238

Bacon, Francis. 1620. *The Great Instauration*. www.constitution.org/bacon/instauration.htm

Bain, Alison and Heather McLean. 2013. "The Artistic Precariat." *Cambridge Journal of Regions, Economy and Society* 6(1): 93–111.

Baram, Michael. 2009. "Globalization and Workplace Hazards in Developing Nations." *Safety Science* 47(6): 756–766.

Barrett, Jennifer and Phil McManus. 2007. "Civilising Nature: Museums and the Environment." In *Water Wind Art and Debate*, edited by Gavin Birch, 319–344. Sydney: University of Sydney Press.

Barry, John. 2006. "Resistance is Fertile: From Environmental to Sustainability Citizenship." In *Environmental Citizenship*, eited by Andrew Dobson and Derek R. Bell, 21–48. Cambridge, MA: MIT Press.

Beck, Ulrich and Edgar Grande. 2010. "Varieties of Second Modernity: The Cosmopolitan Turn in Social and Political Theory and Research." *British Journal of Sociology* 61(3): 409–443.

Bennett, Tony. 1995. *The Birth of the Museum: History, Theory, and Politics*. London: Routledge.

Braddock, Alan C. 2009. "Ecocritical Art History." *American Art* 23(2): 24–28.

Burke, Edmund. 1986. *Reflections on the Revolution in France and on the Proceedings in Certain Societies in London Relative to that Event*, edited by Conor Cruise O'Brien. Harmondsworth: Penguin. AuQ19

Bush, Vannevar. 1945. "As We May Think." *Atlantic Monthly*, July, 101–108.

Cameron, Fiona, Bob Hodge and Juan Francisco Salazar. 2013. "Representing Climate Change in Museum Space and Places." *Wiley Interdisciplinary Reviews: Climate Change* 4: 9–21.

Cherbo, Joni M. and Margaret J. Wyszomirski. 2000. "Mapping the Public Life of the Arts in America." In *The Public Life of the Arts in America*, edited by Joni M. Cherbo and Margaret J. Wyszomirski, 3–21. New Brunswick, NJ: Rutgers University Press.

Cole, Luke W. and Sheila R. Foster. 2001. *From the Ground Up: Environmental Racism and the Rise of the Environmental Justice Movement*. New York: New York University Press.

Commission of the European Communities. 2008, December 3. *Impact Assessment*. Commission Staff Working Paper Accompanying the Proposal for a Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (WEEE) (recast). COM (2008) 810 Final. Brussels: Commission of the European Communities.

Curry, Patrick. 2006. *Ecological Ethics: An Introduction*. Cambridge: Polity Press.

Dalton, Russell J. 2005. "The Greening of the Globe? Crossnational Levels of Environmental Group Membership." *Environmental Politics* 14(4): 441–459.

de-Shalit, Avner. 2006. "Nationalism." In *Political Theory and the Ecological Challenge,* edited by Andrew Dobson and Robyn Eckersley, 75–90. Cambridge: Cambridge University Press.

Dean, Hartley. 2001. "Green Citizenship." *Social Policy & Administration* 35(5): 490–505.

Dobson, Andrew. 2003. *Citizenship and the Environment.* Oxford: Oxford University Press.

Duncan, Carol. 1995. *Civilizing Rituals: Inside Public Art Museums.* London: Routledge.

Ecuadorian Constitution. 2008. www.asambleanacional.gob.ec/documentos/constitucion_de_bolsillo.pdf

Ford, Henry. 1929. *My Philosophy of Industry: An Authorized Interview by Ray Leone Faurote.* New York: Coward-McCann.

Fraser, Andrea. 2001. "Museum Highlights: A Gallery Talk." In *A Companion to Cultural Studies,* edited by Toby Miller, 391–406. Oxford: Blackwell.

Gagliano, Monica. 2013. "Green Symphonies: A Call for Studies on Acoustic Communication in Plants." *Behavioral Ecology* 24(4): 789–796.

García Canclini, Néstor. 1995. *Hybrid Cultures: Strategies for Entering and Leaving Modernity.* (trans. Christopher L. Chiappari and Silvia L. López). Minneapolis: University of Minnesota Press.

Gladwell, Valerie F., Daniel K. Brown, Carly Wood, Gavin R. Sandercock and Jo L. Barton. 2013. "The Great Outdoors: How a Green Exercise Environment Can Benefit All." *Extreme Physiology & Medicine* 2: 3.

Greenwash Guerrillas. n.d. http://greenwashguerrillas.wordpress.com

Groves, Richard H. 1995. *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism 1600–1860.* Cambridge: Cambridge University Press.

Hardin, Garrett. 1968. "The Tragedy of the Commons." *Science* 162(3859): 1243–1248.

Hegel, Georg Wilhelm Friedrich. 1954. *The Philosophy of Hegel,* edited by Carl J. Friedrich. (trans. Carl J. Friedrich, Paul W. Friedrich, W.H. Johnston, L.G. Struthers, B. Bosanquet, W.M. Bryant and J.B. Baillie). New York: Modern Library.

Hegel, Georg Wilhelm Friedrich. 1988. *Lectures on the Philosophy of World History. Introduction: Reason in History.* (trans. H.B. Nisbet). Cambridge: Cambridge University Press.

Hobbes, Thomas. 1998. *On the Citizen.* (translated and edited by Richard Tuck and Michael Silverthorne). Cambridge: Cambridge University Press.

Horkheimer, Max. 1996. *Critique of Instrumental Reason: Lectures and Essays Since the End of World War II.* (trans. Matthew J. O'Connell et al. [unnamed]). New York: Continuum.

Hume, David. 1739. *A Treatise of Human Nature.* http://michaeljohnsonphilosophy.com/wp-content/uploads/2012/01/5010_Hume_Treatise_Human_Nature.pdf

Hume, David. 1955. *An Inquiry Concerning Human Understanding with a Supplement: An Abstract of a Treatise of Human Nature,* edited by Charles W. Hendel. Indianapolis: Bobbs-Merrill.

Humphreys, David. 2009. "Environmental and Ecological Citizenship in Civil Society." *The International Spectator: Italian Journal of International Affairs* 44(1): 171–183.

International Energy Agency. 2012. *Golden Rules for a Golden Age of Gas: World Energy Outlook Special Report on Unconventional Gas.* Paris: International Energy Agency.

Jackson, Tim. 2009. *Prosperity Without Growth? The Transition to a Sustainable Economy.* London: Sustainable Development Commission.

Karpowitz, Christopher F., Chad Raphael and Allen S. Hammond IV. 2009. "Deliberative Democracy and Inequality: Two Cheers for Enclave Deliberation Among the Disempowered." *Politics & Society* 37(4): 576–615.

Klein, Paul. 2012. "Three Ways to Secure Your Social License to Operate in 2013." *Forbes,* December 28. www.forbes.com/sites/csr/2012/12/28/three-ways-to-secure-your-social-license-to-operate-in-2013/

Lam, Steven, Gabi Ngcobo, Jack Persekian, Nato Thompson, Anne Sophie Witzke and Liberate Tate. 2013. "Art, Ecology and Institutions: A Conversation with Artists and Curators." *Third Text* 27(1): 141–150.

Latour, Bruno. 1993. *We Have Never Been Modern* (trans. Catherine Porter). Cambridge, MA.: Harvard University Press.

Latour, Bruno. 2004. *Politics of Nature: How to Bring the Sciences into Democracy* (trans. Catherine Porter). Cambridge, MA: Harvard University Press.

Latour, Bruno. 2008. "'It's Development, Stupid!' or: How to Modernize Modernization." www.bruno-latour.fr/sites/default/files/107-NORDHAUS&SHELLENBERGER-GB.pdf

Latta, P. Alex. 2007. "Locating Democratic Politics in Ecological Citizenship." *Environmental Politics* 16(3): 377–393.

Liberate Tate. 2014. Podcast. http://culturalstudies.podbean.com/2014/04/22/liberate-tate-and-the-artistic-struggle-against-big-oil/?token=a8e5a05c66621c7bdfb397cd945fe7bf

Lynch, Michael J., Michael A. Long, Kimberly L. Barrett and Paul B. Stretesky. 2013. "Is it a Crime to Produce Ecological Disorganization? Why Green Criminology and Political Economy Matter in the Analysis of Global Ecological Harms." *British Journal of Criminology* 53(6): 997–1016.

MacGregor, Sherilyn. 2006. *Beyond Mothering Earth: Ecological Citizenship and the Politics of Care*. Vancouver: University of British Columbia Press.

Marcuse, Herbert. 1972. "Ecology and Revolution." *Liberation* 16: 10–12.

Martín-Barbero, Jesús. 2001. "Introducción." *Imaginarios de nación: Pensar en medio de la tormenta,* edited by Jesús Martín-Barbero, 7–10. Bogotá: Ministerio de Cultura.

Marx, Leo. 2008. "The Idea of Nature in America." *Daedalus* 137(2): 8–21.

Maxwell, Richard and Toby Miller. 2012. *Greening the Media*. New York: Oxford University Press.

Miller, Toby. 1998. *Technologies of Truth: Cultural Citizenship and the Popular Media*. Minneapolis: University of Minnesota Press.

Miller, Toby. 2007. *Cultural Citizenship: Cosmopolitanism, Consumerism, and Television in a Neoliberal Age*. Philadelphia: Temple University Press.

Miller, Toby and George Yúdice. 2004. *Política Cultural*. Barcelona: Gedisa.

Morris, William. 1884. "Art and the Beauty of the Earth." www.marxists.org/archive/morris/works/1881/earth.htm

Ostrom, Elinor. 2000. "Reformulating the Commons." *Swiss Political Science Review* 6(1): 29–52.

Pepper, David. 2000. "Environmentalism." In *Understanding Contemporary Society: Theories of the Present,* edited by Gary Browning, Abigail Halci and Frank Webster, 445–462. London: Sage Publications.

Platform Carbonweb. n.d. http://carbonweb.org/

Plato. 1972. *The Laws*. (trans. Trevor J. Saunders). Harmondsworth: Penguin.

Precautionary Principle. n.d. www.sehn.org/wing.html

Prno, Jason and D. Scott Slocombe. 2012. "Exploring the Origins of 'Social License to Operate' in the Mining Sector: Perspectives from Governance and Sustainability Theories." *Resources Policy* 37(3): 346–357.

Renwick, Douglas W.S., Tom Redman and Stuart Maguire. 2013. "Green Human Resource Management: A Review and Research Agenda." *International Journal of Management Reviews* 15(1): 1–14.

Rio Declaration on Environment and Development. 1992. www.unesco.org/education/nfsunesco/pdf/RIO_E.PDF

Rosen, Christine Meisner and Christopher C. Sellers. 1999. "The Nature of the Firm: Towards an Ecocultural History of Business." *Business History Review* 73(4): 577–600.

Schauer, Thomas. 2003. *The Sustainable Information Society: Vision and Risks*. Vienna: European Support Centre of the Club of Rome.

Schwenkenbecher, Anne. 2014. "Is There an Obligation to Reduce One's Individual Carbon Footprint?" *Critical Review of International Social and Political Philosophy* 17(2): 168–188.

Seyfang, Gill. 2005. "Shopping for Sustainability: Can Sustainable Consumption Promote Ecological Citizenship?" *Environmental Politics* 14(2): 290–306.

Simmel, Georg. 2007. "The Philosophy of Landscape." (trans. Josef Bleicher) *Theory, Culture & Society* 24(7–8): 20–29.

Smith, Kimberly K. 2007. *African American Environmental Thought: Foundations*. Lawrence: University of Kansas Press.

Socialicense.com. n.d. http://socialicense.com/definition.html

"Special Issue: Social License to Operate." 2006. *International Journal of Mining, Reclamation and Environment* 20(3).

Swanton, Christine. 2010. "Heideggerian Environmental Virtue Ethics." *Journal of Agricultural and Environmental Ethics* 23(1–2): 145–166.

Thomson, Ian and Robert G. Boutilier. 2011. "Social License to Operate." *SME Mining Engineering Handbook*, edited by Peter Darling, 1779–1796. Littleton: Society for Mining, Metallurgy and Exploration.

Thornes, John E. 2008. "A Rough Guide to Environmental Art." *Annual Review of Environment and Resources* 33: 391–411.

Viney, Leslie. 2010. "Fuelling the Future." *Aral*. www.aral.de/assets/bp_internet/globalbp/STAGING/global_assets/downloads/B/BPM_05one_Energy_text.pdf

Woo, Chungwon, Yanghon Chung, Dongphil Chun, Seunghun Han and Dukhee Lee. 2013. "Impact of Green Innovation on Labor Productivity and its Determinants: An Analysis of the Korean Manufacturing Industry." *Business Strategy and the Environment* doi:10.1002/bse.1807

World Commission on Environment and Development. 1987. www.un-documents.net/wced-ocf.htm

12 Putting a Human Face on Climate Change

Ashley Dawson

In late 2013, Ioane Teitiota tried to become the world's first official climate refugee. In a case argued before the High Court of New Zealand, Teitiota claimed that he should be granted refugee status because rising sea levels caused by anthropogenic climate change imperil his ability to live in his home country, the Pacific island nation of Kiribati (Queally 2013). Teitiota's suit was unsuccessful. In rejecting his petition, Judge John Priestly wrote that Teitiota's refugee claim did not meet the country's legal standards for asylum since "by returning to Kiribati, [Teitiota] would not suffer a sustained and systemic violation of his basic human rights such as the right to life . . . or the right to adequate food, clothing and housing" (Queally 2013). In ruling against Teitiota, however, Priestly was not simply deciding an individual case, for he was also clearly aware of the global precedent that a positive ruling would set. Were Teitiota's asylum claim to be successful, it might serve as a model for other jurisdictions, and, Priestly stated, "at a stroke millions of people who are facing medium-term economic deprivation, or the immediate consequences of natural disasters or warfare, or indeed presumptive hardships caused by climate change, would be entitled to protection under the Refugee Convention" (Queally 2013). For Priestly and many other legal scholars, it is not the prerogative of the court system to alter the terms of the UN Refugee Convention, which was approved by member states shortly after World War Two. Yet if climate refugees cannot be said to be subjected to rights violations similar to those carried out by the Nazis, climate refugees undeniably are, as Andrew Ross has written, "living embodiments of the quandaries raised by climate debt" (Ross 2013, 36). What, it will be increasingly imperative to ask, is owed to these displaced people, and who owes it to them?

The challenge of climate change–induced migration is only going to grow starker. References to the people displaced by environmental disasters populate most high-profile accounts of climate change, from the British government's *Stern Report* (2006; see Osborne 2006), to the assessment reports of the Intergovernmental Panel on Climate Change, to alarms from relief organizations such as Oxfam, which states that "today there are an estimated 26 million climate refugees, yet by 2050, 200 million people a

year will be on the move due to hunger, environmental degradation and loss of land due to climate change" (Oxfam Australia n.d.). Indeed, climate refugees are often deployed by NGOs such as Oxfam as "the human face of climate change." For activists intent on mobilizing the impending inundation of small island states like Tuvalu and the Maldives to castigate wealthy, greenhouse gas-emitting nations in the global North for their inaction on climate change, the figure of the climate refugee brings home the human tragedy created by such abdication of responsibility.

Yet as Judge Priestly noted in rejecting Ioane Teitiota's asylum claim, no international convention currently recognizes the needs and rights of climate refugees. They are invisible in juridical terms. Since the vast majority of people displaced by environmental calamities engage in internal rather than international migration, they also tend to be invisible on a quotidian level to most people in wealthier nations. To represent climate refugees in cultural institutions of the global North is to conjure up a figure that tends to be distant, either in geographical or temporal terms. The attention of visual artists, journalists and exhibition organizers has only recently turned to climate refugees, who consequently appear relatively unfamiliar in comparison with iconic figures such as the polar bear and the melting glacier as signifiers of climate change (Dobrin and Morey, 2009). A rhetoric of de-spectralization, of a rendering visible, linked to an activist insistence on the imperative to tackle climate change in meaningful ways, accompanies the figure of the climate refugee. Yet if the climate refugee helps humanize the otherwise diffuse threats of climate chaos there are significant pitfalls to the tropes of invisibility and even extinction that accompany many activist representations of climate change–displaced peoples. In what follows, I discuss efforts to galvanize the attention of those in the global North to the challenges faced by denizens of Pacific island nations threatened by rising sea levels. In their different ways, each of the projects I discuss demonstrates the imperative need as well as the political contradictions of efforts to put a human face on climate change.

CONFERRING INVISIBILITY: CLIMATE CHANGE AND INTERNATIONAL REFUGEE CONVENTIONS

Climate change tends to be described in the future tense, as a threat to generations to come rather than to those alive today. Yet as Christian Parenti suggests in *Tropics of Chaos,* for people inhabiting the once-colonized belt of equatorial nations around the globe, climate change is a quotidian reality that shapes the present in baleful ways (Parenti 2012). The global North has paid scant attention to the deadly conjunction of political and climatic instabilities unfolding throughout much of the global South, Parenti argues, with the notable exception of the U.S. military. This future imperfect tense has begun to shift. The US cable channel Showtime recently produced a

docu-drama, *Years of Living Dangerously,* for example, in which celebrities like Harrison Ford and Jessica Alba explore the contemporary impact of climate change in various locations around the world (Wihbey 2014). As welcome as such initiatives may be, popular representations of contemporary climate change still slide all too often into scenarios of catastrophic state failure, which in turn feed into discussions of "climate change war" (Holthaus 2004).

Accounts of climate refugees have from the beginning sought to challenge such an incipient climate militarism, with its hardening of borders and elitist lifeboat mentality. In one of the first accounts of what they called *environmental refugees,* for instance, the UK-based New Economics Foundation highlighted questions of justice and debt: "Hysteria and hypocrisy walk in the footsteps of refugees and migrants. The paranoia of wealthy countries is deeply ironic. Their carbon intensive lifestyles are driving global warming, which is likely to become the largest single factor forcing people to flee their homes around the world. There is an obligation on the nations most responsible for historic greenhouse gas emissions, Europe and North America, to make sure that environmental refugees are recognised and protected" (Simms 2003). The paranoia to which the NEF refers here is that of green neo-fascist movements in the global North, who use a Malthusian rhetoric of climate xenophobia to scapegoat migrants and other refugees (Ross 2011). By retaining narrow definitions of refugee status linked to overt political persecution, international organizations such as the United Nations, NEF argues, help ensure that climate refugees will not only be invisible but will be perceived as illegitimate and even opportunistic so-called illegal aliens.

The juridical invisibility of climate refugees is grounded in the specific historical conditions under which the United Nations Convention was framed. Article 1 of the Convention defines a refugee in the following terms:

> A person who, owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it. (United Nations 1951)

As legal theorist Jane McAdam points out, a number of problems arise for climate change–displaced peoples from this definition of the refugee (McAdam 2012). While people fleeing political persecution (e.g., by the Nazi regime) clearly fit the UN definition, climate change is not usually seen as an equivalent form of persecution, as Judge Priestly's ruling in the Teitiota asylum case makes clear. This is partially because it is hard to establish direct causal links between particular natural disasters and the more general

transformation of the environment resulting from greenhouse gas emissions. It also stems, however, from the fact that climate change, while it may play a role in generating particular spectacular disasters such as hurricanes and cyclones, is transforming the environment in a very gradual manner. Climate change could be seen as the ultimate form of what Rob Nixon has called slow violence (2012).

For McAdam, the notion of the climate refugee is also problematic since, she argues, it is impossible to identify the perpetrator, and it is also impossible to identify specific personal traits (such as race or religion) for which climate refugees are being persecuted (McAdam 2012, 186). McAdam's arguments, far more than the scientific question of causal links between particular disasters and climate change in general, lay bare not simply the outdated character of the Refugee Convention but also the ideological nature of the international legal system. It is quite simple, in fact, to determine relative responsibility for fossil fuel-derived carbon dioxide pollution—from 1750 onward—on a country-by-country basis. According to a clear itemization created by NASA climatologist James Hansen, the US and UK account for over 50% of historical emissions, with Germany and Australia clocking in at third and fourth. Responsibility for climate change–displaced populations can easily be established using Hansen's itemization (Hansen 2008).

There is, in addition, a long history of colonial exploitation and oppression, not to mention contemporary neoliberal forms of extraction, which must be taken into account when confronting the question of climate refugees. Contemporary international refugee conventions conveniently obscure this history. Worse still, standard legal recognition would not necessarily address the predicament of climate refugees, but may simply create another level of second-class immigrant status for migrants, dooming them to be quarantined in prison-like refugee camps and detention centers. This is hardly adequate recompense for the displacement climate refugees have suffered. As climate debtors, the rich nations of the world owe climate refugees sanctuary and civil protection, as Andrew Ross argues (2014), although more just and adequate forms of restitution should also be demanded on their behalf.

THE ART OF MAKING VISIBLE: CLIMATE REFUGEES AND THE DOCUMENTARY TURN

In his work on the politics of aesthetics, Jacques Rancière argues that art plays a constitutive role in political life by structuring the sensory framework through which we apprehend the world. For Rancière, that is, aesthetics "is a delimitation of spaces and times, of the visible and the invisible, or speech and noise, that simultaneously determines the place and the stakes of politics as a form of experience" (Rancière 2004, 13). We might well wonder about such sweeping claims for the role of the aesthetic, but Rancière's

arguments concerning art's power to confer visibility certainly resonate with the documentary inclination of much contemporary art. For T. J. Demos, contemporary radical aesthetic work tends to be driven by an insistence on rendering visible those normally excluded from the political imaginary of globalization, the migrants, refugees, and other human flotsam produced by turbo-capitalism and its dangerous twin, exclusionary nationalism (Demos 2013, 28). Surely there can be no more powerful symbol of the terminal contradictions of neoliberal capitalism, its ravenous drive to consume the very planetary ecosystem upon which it is dependent, than those displaced by the various forms of climate chaos unleashed by this unsustainable system: climate refugees.

One of the first uses of the term climate refugee in print was by the Collectif Argos (www.collectifargos.com/en/home), a group of ten journalists and photographers whose 2007 book of this title set out to explore the human impact of climate change in a variety of global hotspots. The Argos Collective's work challenges the Refugee Convention's restrictive legal distinction between migrants and refugees, which assumes that the former travel voluntarily while the latter are on the move because of political oppression. Covering sites menaced by sea level rise like the Sundarban Islands in the Bay of Bengal, the Maldive Islands in the Indian Ocean, and the city of New Orleans, as well as places threatened by desiccation such as northern China and Chad, the Argos Collective's work dismantles such facile distinctions. In their interview with a Bengali man displaced from his home in the Sundarbans, for example, the collective shows how salinization of the land produced by rising tides has made farming impossible, driving people to leave for the city: "I had to stop fishing because the tigers were getting more aggressive and attacks were increasing. I was too scared. There was no work outside the mangrove forest and I wasn't able to feed my family, so I followed my brother-in-law to Dhaka" (Collectif Argos 2010, 63).

This interview also highlights the Argos Collective's other key interventions: instead of focusing on an inanimate object like a melting glacier, *Climate Refugees* documents the impact of climate change on people; it shows that climate change is impacting people in the present rather than in some remote future; the collective's work demonstrates that climate change–induced migration is often the result of slow violence rather than more telegenic "natural disasters"; and it does so using a combination of narrative and photographs rather than abstract statistics concerning carbon emissions. In these various ways, the Argos Collective offers a creative response to the problem of the invisibility of climate change, which has often filtered into public discourse through abstract scientific discourses of climate modeling and forecasting. As Julie Doyle has argued, "since the Enlightenment, seeing our environment has become metonymic for understanding and valuing it: a visual aesthetics and an epistemology promoted and inscribed through nineteenth century landscape painting, photography, and, since the 1960s, satellite images from space. . . . Given the privileging of the landscape as a

powerful symbolic image of nature since the Enlightenment, global warming and climate change have limited symbolic resonance, signifiable only when their impact has been seen on the landscape, thus effectively too late" (Doyle 2009, 285). Unlike the images discussed by Doyle, which dramatize climate change in a manner that forecloses meaningful political action by suggesting that the apocalyptic future has already arrived, the Argos Collective generate narratives displacement that tie directly into struggles for climate justice. This political engagement is also apparent in the display format of the *Climate Refugees* project: it is available not just as a book but also through the Collective's website, where short films bring portions of the text alive and where a redacted, portable version of the project is available for printout and display at public events.

The Argos Collective's juxtaposition of textual narrative and photographs gives *Climate Refugees* a depth that is often lacking in contemporary depictions of refugees. As T. J. Demos notes in his discussion of Renzo Martens' *Enjoy Poverty,* a devastating film exposé of the contemporary aid industry in the Democratic Republic of Congo, mainstream photojournalistic depictions of refugees flow into a global image industry for which poverty is a fuel. For Demos, such journalistic representations unleash "a vicious cycle of profit, objectification, and sympathy that perpetuates clichés of Africans as helpless victims mired in misery, reducing spectators to depoliticized charitable donors" (Demos 2011). While the Argos Collective uses relatively traditional photojournalistic images of people in sites threatened by climate change, which might be seen to generate precisely the sort of gap between an aesthetics of empathy and the structural causes of poverty that Demos criticizes, the narratives that accompany such images in the case of the Argos Collective, as well as the brief films available on the group's website, offer a nuanced and often radical account of the structural conditions that generate the imperiled forms of life they depict in visual images.

Despite the many strengths of the Argos Collective project, it is important to ask whether the very concept of the climate refugee plays into a form of catastrophism. In order to challenge the failure of wealthy nations such as the US to take meaningful action to mitigate emissions, as well as nascent climate xenophobia in such nations, environmental activists have frequently resorted to a problematic catastrophist discourse. Catastrophism constantly projects ahead to an inevitable apocalyptic denouement in order to galvanize action, but, as Eddie Yuen has argued, actually leaves us feeling paralyzed and hopeless in the present (Yuen 2012). In the catastrophist discourse associated with climate refugees, displaced people are reduced to what Giorgio Agamben calls "bare life" or *zoe* since they are deprived of the conditions that allow for *bios* or political life (Agamben 1995). Climate refugees have been quite literally stripped of the territory on which sovereignty is grounded, and therefore no longer have access to the status of citizenship conferred by the nation-state system. Reduced to the condition of bare life, refugees are all too quickly analogized to hapless nonhuman victims of

climate change such as the polar bear. In other words, although this rhetoric of victimization and debt is well intended, like catastrophist discourse in general, it is politically disenabling. Under the right circumstances, it may even feed into precisely the reactionary green neo-fascist currents it seeks to combat. By presenting climate refugees as helpless victims, environmentalists become complicit with the foreclosure of collective political action to ameliorate their situation. Worse still, they may also play into the hands of global elites, who are no strangers to nationalist bunkering and imperial genocide.

The work of environmentally concerned artists in the Maldives' Pavilion at the 2013 Venice Biennale illustrate some of the problems of catastrophist discourse about environmental refugees. The pavilion was commissioned by the Maldive Islands' Ministry of Tourism, Arts, and Culture, and curated by a collective known as the *Chamber of Secrets* that is made up of an Egyptian, an Italian and a Lebanese artist. The mediation of Maldivian identity by globetrotting artist/curators raises many questions about subaltern speech, particularly given the curators' decision to organize the pavilion around the theme *Portable Nation*. This theme raises interesting questions about the continuity of national culture in the face of geographical movement that could be applied to many diasporic groups. In the case of the Maldives Pavilion, however, portability is an imperative linked clearly in the curators' minds to geographical effacement, as their background statement suggests: "The Maldives is known to be the romantic dream for tourists seeking exotic destinations. Through its history, the Maldives has always described itself as the emerging and submerging islands" (Maldives Pavilion 2013). What logic links these two statements about the Maldives? Is there no connection between the neocolonial discourses that represent the islands as exotic destinations for tourists from the global North and historical accounts of the Maldives as "emerging and submerging islands"? Furthermore, exactly who penned such descriptions? In the curators' statement, it seems that it was the islands themselves, an attribution in line with the kind of colonial travel narratives described by Mary Louis Pratt in *Imperial Eyes,* narratives that conveniently conflate people and territory (Pratt 2007).

The curators' intention to dramatize the catastrophic plight of climate refugees using the case of the Maldives is made even more apparent in the work of the artists whose work they have assembled. Take the work of Wooloo, a duo of Danes, whose presentation, entitled *Maldivian Coconut (Capriccio),* consisted of a crop of coconuts from the Maldives thrown into the Venetian canals. In their artist statement, Wooloo links the floating coconut not simply to images of national identity, but to a dystopian future: "The coconut and Maldivian life are essentially inseparable. Yet the image of coconuts in the water is also an image of destruction: following the last tsunami to hit the Maldives, the vast number of coconuts floating in the water was a major sign of ruin. When rising seas eventually submerge the Maldives, its coconuts will bear witness to its last days. Floating away like

pieces of memory, the DNA of an extinct time" (Wooloo 2014). Do floating coconuts symbolize tsunami destruction alone to residents of the Maldives? What about natural bounty? Or homeland? No Maldivians seem to have been consulted on this score. More upsettingly, though, Wooloo links the floating coconut not simply to previous natural calamities but to extinction. The facile leap from the cultural register to the natural one, from disasters endured to wholesale biological extermination, is deeply troubling.

The catastrophist rhetoric evident in Wooloo's artist statement permeates the works on display at the Maldives Pavilion, the vast majority of which are by European or US-based artists. Italian artist Stefano Cagol, for example, contributes a work entitled *The Ice Monolith*. Cagol's piece consists of a giant block of ice from an alpine glacier, which melted gradually during the course of the Biennale. At this point, such images of environmental alarm have become nothing if not banal. In addition, as noted in the preceding discussion of environmentalist visual rhetorics, such images tend to foreclose meaningful political agency. The inevitability of Cagol's melting ice block underscores the rhetoric of extinction that suffuses many of the artists' statements in *Portable Nation,* which in turn dramatizes the purported helpless victimhood of the Maldivians and our own impotence to engage in meaningful forms of political and social transformation.

Yet, like Wooloo, Cagol intends to make a gesture of transnational solidarity. As his artist statement puts it, "Ice melts to water. Water that in the next decades risks to overwhelm the most sensitive areas of the globe—firstly Maldives (but also Venice). Alps and Maldives, ice and sun, so far but so close, connected by the same fate" (Cagol 2014). Cagol's gesture of solidarity is grounded in perceptions of accelerating climatic instability that ignore the power differentials between Europeans and Pacific Islanders. Despite the efforts of critics from Bruno Latour to Neil Smith to underline the social construction of nature, artists like Wooloo and Cagol seem to assume that natural processes are not mediated through human social relations and that "natural" disasters in Europe and the Maldives will naturally generate unity between affected populations. Cagol and other contributors to *Portable Nation* apparently lack the most basic awareness of the combined but uneven nature of climate chaos (Smith 2006). In tandem with this insensitivity to the stratification of vulnerability, Cagol's catastrophist rhetoric takes for granted the inundation of the Maldive Islands, and with it the extinction of the Maldivian way of life. The message is relentless and tone-deaf, as is evident from the work of one of the Pavilion's curators, Khaled Ramadan, whose contribution is entitled *Maldives To Be or Not* (Ramadan 2014).

MIGRATION AS ENCLOSURE

How do Pacific Islanders themselves imagine their future? Emphatically not in the apocalyptic terms of the art world or international NGOs. In her

ethnographic work on this topic, Karen McNamara explains that Pacific Island representatives to the United Nations refuse to see themselves as vulnerable victims (McNamara 2009). This in no way constitutes a denial of climate change and its baleful impacts on low-lying island nations. Instead, in contradistinction to both the inaction of powerful carbon-emitting nations like the US and to the apocalyptic counter-discourses of NGOs and the art world, Pacific Islanders insist that developed countries must radically mitigate their emissions and must provide adequate funds for adaptation. Exodus and extinction are simply not a part of their imagined future. Talk about climate refugee status may be damaging to their struggle as sovereign nations in the present inasmuch as it inadvertently legitimizes their impending mass displacement, with the corresponding loss not simply of cultural identity but also of sovereignty and self-determination.

Pacific Islanders' rejection of this rhetorical status as victim states should not be surprise given the history of the category *environmental refugee*. While many people have been displaced by natural disasters across history, the specific concept of the environmental refugee can be traced back to the US military's forced removal of the inhabitants of the Bikini Atoll during Operation Crossroads. In 1946, emissaries of the US convinced the Bikini Islanders that it was their Christian duty to vacate their homeland "for the good of mankind and to end all world wars" (Barker 2004). The US subsequently exploded a powerful nuclear bomb in the atoll, contaminating a wide swath of the Marshall Islands, including the barren island to which the Bikinians had been removed. In 1968, the US Atomic Energy Commission determined that radiation levels were low enough to permit the Bikinians to return to their homeland after years of exile. Subsequent research revealing dangerous contamination levels was withheld from the islanders. Evidence of this dangerous radiation only emerged following a Bikinian lawsuit in 1975 disclosing that the islands were unfit for human habitation. The Bikinians have since fought tirelessly for adequate compensation for the dispossession and poisoning to which they were subjected in the federal court system. Although this struggle has resulted in the establishment of a resettlement trust fund, compensation has not been adequate to deal with the many social and medical problems faced by the Bikinians. In 2010, the Supreme Court rejected a case filed by Bikinians against the US Government seeking compensation under the Fifth Amendment for illegal land dispossession, apparently putting an end to their struggle for reparations.

Contemporary apocalyptic representations of the Pacific Islands underline the erasure of this history of colonial subjection and environmental racism. But that is not all. Conceptions of migration as a means to cope with climate change that circulated at the Venice Biennale are of a piece with a more sweeping shift from notions of mitigation to adaptation that have become hegemonic in the global North in recent years. As UN-brokered climate talks have backed further away from the Kyoto ideals of common but differentiated responsibility for mitigation and adaptation, talk has shifted

increasingly to resilience in the face of inevitable climate change, jettisoning all sense of responsibility to radically diminish carbon emissions. Indeed, climate migration has been integrated into neoliberal responses to climate change, to the point that it is increasingly represented as a dynamic individual response to climate instability rather than a form of collective dispossession (Felli 2013). Migration becomes an entrepreneurial choice that can help bootstrap climate change–threatened communities out of poverty, and of course also benefit wealthy nations who are in need of the intellectual and physical labor power brought by such guest workers. This attitude toward climate migrants has come to permeate policy documents produced by the World Bank and the IMF in recent years, and is also evident in the legal measures articulated by scholars such as Jane McAdam. As in so many of the works on display at the Venice Biennale, the assumption here is that climate change will inundate Southern states, rendering claims of national sovereignty moot. Resiliency-building work will henceforth be undertaken through a migration process carefully managed by minions of multinational corporate power like the IMF. This is, in other words, a key means through which climate change–affected populations can be integrated into new circuits of capitalist accumulation by dispossession.

CONCLUSION

Climate change–induced migration poses enduring complexity of issues of representation, the thorniness of which Gayatri Spivak famously warned of in her essay "Can the Subaltern Speak?" (Spivak 1988). This is not to suggest that we should not attempt to engage with the plight of climate refugees. We must, I believe, heed Rob Nixon's call to "give figurative shape to the formless threats" and slow violence associated with climate change, from the attritional destruction of sea-level rise and salinization to spectacular natural disasters like Typhoon Haiyan in the Philippines (Nixon 2010, 10). Nonetheless, the work gathered at the Maldives Pavilion in the Venice Biennale suggests that we need to be vigilant about the rhetoric that we adopt in our urgent attempts to communicate about the environmentalism of the poor. This seems particularly true in the case of climate refugees, a category likely to become more prominent given the failure of mitigation efforts.

AuQ20

Curators such as the American Museum of Natural History's Jennifer Newell are paying increasing attention to the impact of climate change on people today (Newell 2014). Newell's *Rethinking Home: Climate Change in New York and Samoa* (www.amnh.org/our-research/anthropology/projects/rethinking-home) links people affected by climate change, bridging vast geographical differences by focusing on processes of transformation in a key cultural and material site such as the home. As Newell puts it, "The issues Pacific Islanders are dealing with now are going to be important for us all. Impending climate refugee status is something that all museum visitors

should be concerned about, not just as empathetic people with global consciousness, but also in terms of their own direct futures" (Newell 2014). As Newell suggests, museums are going to be an increasingly important site for representing climate change to the public in the global North and South. Attempts to put a human face on climate change such as those I have discussed are, consequently, likely to become increasingly prominent in curatorial practice. As this paper has underlined, climate justice activists must monitor the rhetorical impact of this category carefully to ensure that it does not inadvertently bring the forms of loss it seeks to address into being. Equally importantly, I would suggest, we need to develop forms of co-research and collaborative creation that link relatively privileged writers and artists such as those whose work appears at the Venice Biennale to climate change–affected communities. Only through such efforts to ensure ethical and responsive engagement may we hope to build meaningful forms of solidarity in the struggle for climate justice.

REFERENCES

Agamben, Giorgio. 1995. "We Refugees." *Symposium* 49(2): 114–119.

Barker, Holly M. 2004. *Bravo for the Marshallese: Regaining Control in a Post-Nuclear, Post-Colonial World*. Belmont, CA: Wadsworth.

Cagol, Stefano. 2014. "The Ice Monolith." Artist's Statement, Maldives Pavilion at the Venice Biennale. http://maldivespavilion.com/blog/maldives-pavilion-artists/stefano-cagol/

Collectif Argos. 2010. *Climate Refugees*. Boston, MA: MIT Press.

Demos, T.J. 2011. "Poverty Pornography, Humanitarianism, and Neoliberal Globalization: Notes on Some Paradoxes in Contemporary Art," www.ucl.ac.uk/art-history/about_us/academic_staff/dr_tj_demos/further_publications/Demos-Poverty_Porn.pdf

Demos, T.J. 2013. *The Migrant Image: The Art and Politics of Documentary During Global Crisis*. Durham, NC: Duke University Press.

Dobrin, Sidney I. and Sean Morey, eds. 2009. *Ecosee: Image, Rhetoric, Nature*. Albany, NY: SUNY Press.

Doyle, Julie. 2009. "Seeing the Climate?: The Problematic Status of Visual Evidence in Climate Change Campaigning." In *Ecosee: Image, Rhetoric, Nature*, edited by Sidney I. Dobrin and Sean Morey, 285–286. Albany, NY: SUNY Press, 2009.

Felli, Romain. 2013. "Managing Climate Insecurity by Ensuring Continuous Capital Accumulation: 'Climate Refugees' and 'Climate Migrants.'" *New Political Economy* 18(3): 337–363.

Hansen, James. 2008. "Letter to Kevin Rudd." www.columbia.edu/~jeh1/mailings/2008/20080401_DearPrimeMinisterRudd.pdf

Holthaus, Eric. 2004. "Climate Change War Is not a Metaphor" *Slate*. April 18. www.slate.com/articles/technology/future_tense/2014/04/david_titley_climate_change_war_an_interview_with_the_retired_rear_admiral.single.html

Maldives Pavilion at the Venice Biennale, Curators' Background Statement. 2013. http://maldivespavilion.com/blog/background/

McAdam, Jane. 2012. *Climate Change, Forced Migration, and International Law*. New York: Oxford University Press.

McNamara, Karen Elizabeth. 2009. "'We Do not Want to Leave Our Land': Pacific Ambassadors at the United Nations Resist the Category of 'Climate Refugees.'" *Geoforum* 40: 475–483.

Newell, Jennifer. 2014. Interview with Author, May 3.

Nixon, Rob. 2012. *Slow Violence and the Environmentalism of the Poor.* Cambridge, MA: Harvard University Press.

Osborne, Hilary. 2006. "Stern Report: The Key Points." *The Guardian*. October 30. www.theguardian.com/politics/2006/oct/30/economy.uk

Oxfam Australia. n.d. "Impacts of Climate Change." https://www.oxfam.org.au/explore/climate-change/impacts-of-climate-change/

Parenti, Christian. 2012. *Tropics of Chaos: Climate Change and the New Geography of Violence*. New York: Nation Books.

Pratt, Mary Louis. 2007. *Imperial Eyes: Travel Writing and Transculturation*. New York: Routledge.

Queally, John. 2013. "World's First Climate Refugee Rebuffed by New Zealand." *Common Dreams*. www.commondreams.org/headline/2013/11/26-1

Ramadan, Khaled in collaboration with Abed Anouti. 2014. "Maldives To Be or Not," Artist's Statement, Maldives Pavilion at the Venice Biennale. http://maldivespavilion.com/blog/maldives-pavilion-artists/khaled-ramadan-in-collaboration-with-abed-anouti/

Rancière, Jacques. 2004. *The Politics of Aesthetics: The Distribution of the Sensible* (trans. Gabriel Rockhill). London: Continuum.

Ross, Andrew. 2011. *Bird on Fire: Lessons from the World's Least Sustainable City.* New York: Oxford University Press.

Ross, Andrew. 2013. "Climate Debt Denial." *Dissent* 63.3. www.dissentmagazine.org/article/climate-debt-denial

Ross, Andrew. 2014. *Creditocracy and the Case for Debt Refusal*. New York: OR Books.

Simms, Andrew. 2003. Quoted in "Call to Protect Environmental Refugees as Crisis Set o Grown." *New Economics Foundation*. www.neweconomics.org/press/entry/call-to-protect-environmental-refugees-as-crisis-set-to-grow

Smith, Neil. 2006. "There Is no Such Thing as a Natural Disaster." *Understanding Katrina: Perspectives from the Social Sciences*. June 11. http://forums.ssrc.org/understandingkatrina/theres-no-such-thing-as-a-natural-disaster/

Spivak, Gayatri. 1988. "Can the Subaltern Speak?" In *Marxism and the Interpretation of Culture,* edited by Cary Nelson and Lawrence Grossberg, 271–313. Champaign: University of Illinois Press.

United Nations. 1951. *Convention Relating to the Status of Refugees*. https://treaties.un.org/Pages/ViewDetailsII.aspx?&src=UNTSONLINE&mtdsg_no=V~2&chapter=5&Temp=mtdsg2&lang=en#Participants

Wihbey, John. 2014. "Celebrities, Climate, and Showtime's *Years of Living Dangerously.*" *Yale Forum on Climate Change and the Media*. www.yaleclimatemediaforum.org/2014/03/celebrities-climate-and-showtimes-years-of-living-dangerously/

Wooloo. 2014. "Maldivian Coconut (Capriccio)." Artist's Statement. Maldives Pavilion at the Venice Biennale. http://maldivespavilion.com/blog/maldives-pavilion-artists/wooloo/

Yuen, Eddie. 2012. "The Politics of Failure Have Failed: The Environmental Movement and Catastrophism." In *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth,* edited by Sasha Lilley, David McNally, Eddie Yuen and James Davis, 15–43. Oakland, CA: Spectre.

13 Museum Affect

Crocheted Coral, Children's Stories and Possibilities in Queer Time

Scott East

Created in 2005, the *Hyperbolic Crochet Coral Reef* (HCCR) is an ongoing series of projects organized through the Institute for Figuring (IFF) based in Los Angeles, founded by sisters Christine and Margaret Wertheim.[1] The HCCR emerged from artistic experimentations with techniques for modeling hyperbolic space using crochet developed by mathematician Dr. Daina Taimina. Estimates by the IFF suggest 7,000 people have contributed to this large configuration of twenty-five reefs exhibited across ten countries. The main body of the HCCR has been exhibited in fifteen institutions such as the Andy Warhol Museum (March 11–June 17, 2007), The Hayward Gallery—Southbank Center in London (June 11–August 17, 2008), The Science Gallery Dublin (March 20–June 11 2010), Cooper-Hewitt National Design Museum, New York (May 14, 2010–January 9, 2011) and the Smithsonian (October 16, 2010–April 24, 2011).[2] As a response to the plight of coral bleaching attributed to anthropogenic climate change, this ever-expanding network of cultural activity is a significant case study from which to explore museum roles in communicating climate change.

As well as this potted history of institutional support, the HCCR projects have generated significant press coverage, with a journalist for the *New York Times* referring to it as the "environmental version of the AIDS quilt" (Cohen 2008). What is at stake in comparing the HCCR to this earlier community art project, which became the iconic work of AIDS activism and community mobilization? Indeed, it was museums' inability to respond to urgent social issues that prompted the critic Douglas Crimp, writing in the wake of the AIDS epidemic, to imagine the museum in ruins with little possibility for political redemption (1993, 23). While more recent writings have been more hopeful in their assessment of the roles of museums (Cameron and Kelly 2010; Knell et al. 2007; Sandell 2002), the legacy of such failures still haunts museums (Hooper-Greenhill 2007). Both the HCCR and AIDS Quilt began as forms of activism, both quickly becoming popular, their sheer scale raising issues of preservation in a museum context.[3] Both projects adapt traditionally feminine handicrafts and textiles in their production. Both involved collectives of people

working together, inside and outside institutions, to produce and display the work.

These cultural practices intervene in social discussions around urgent political issues. These comparisons are not simply overlapping coincidences. By bringing a queer interpretation to "the global-warming equivalent of the AIDS Quilt" (Weschler 2011, 58), I seek to provide some insight into how museums and cultural practices can play a role in social transformation. Donald Prezosi considers a method of queering, outside of an identity or a specific time, a very useful strategy for intervening in hegemonic discourses that he identifies as so often reinforced by disciplines such as art history and museology (2004, 4). The queer studies scholar Ann Cvetkovic likewise advocates such a critical method through the collective approach of the Public Feelings group where there "are no magic bullet solutions, whether medical or political, just the slow steady work of resilient survival, utopian dreaming, and other affective tools for transformation" (Cvetkovic 2012, 2). Queer accounts have also been concerned with the roles of figures. For example, Douglas Crimp's very influential article on *Mourning and Militancy* during the AIDS crisis, begins by remarking on Lee Edelman's then recent deconstructive reading of the AIDS slogan Silence = Death. Edelman's (1989, 314) account claims that the slogan contributes to the "confusion of the literal and the figural" leading to reinforcing binary essentialisms circulating around the crisis. According to Crimp's analysis while Edelman's reading is not "necessarily wrong" it fails to account for the work that the slogan achieves as a figure and ultimately relies too heavily on a "privileging of the *logos*" (1989, 4). Crimp's article was very important in focusing attention on the affectual dimensions to social movements which concludes, with the polemic call to arms as well as tears: "militancy, of course, then, but mourning too: mourning and militancy" (1989, 18). In an earlier article, Crimp concludes that the science and medical management of the AIDS epidemic is usually taken as a given leading to a view that cultural producers can respond "in only two ways: by raising money for scientific research and service organizations or by creating works that express the human suffering and loss"(1987, 3). While the textual reminders of the names signed into the AIDS Quilt defend against silence and were effective in mobilizing activism and awareness, I move to consider the roles these masses of collectively crocheted coral might be playing in climate change discussions. While scholars including the HCCR's creators are very aware of the work that the crocheted coral performs as figures, the third section of this chapter will discuss them in relation to a specific instance of figuration, which I take from Deleuze and Guattari (1994) in their discussion of aesthetic figures.[4] In the figural potential I provide some sense of the sorts of museum futures which may be formed alongside such cultural practices. As a way of starting this discussion, I begin with my first encounter with the HCCR project through one of the satellite reefs.

HOOKING INTO THE FUTURE

The Sydney Reef was a collaborative installation of crotched hyperbolic coral reef forms at the Powerhouse Museum during Science Week 2009 (August 21–30) and was associated with the larger HCCR project. A local artistic collective, *In Stitches,* facilitated the Sydney exhibition; the installation consisted of over 1,000 individual forms contributed by over 350 crochet artists.[5] It was here that I first came across the HCCR project. The Powerhouse grew out of the Museum of Applied Arts and Sciences collections and as such has a unique brief covering science, technology, design, decorative arts and social history.[6] This very particular institutional history means that in many ways *The Sydney Reef* fitted neatly in the Powerhouse's institutional frame. The reef focuses on a decorative art that has a basis in mathematics. It also speaks to the social history of the struggle to model theoretical mathematical spaces. Friends who were involved with crocheting for the reef project invited me along to one of the crocheting workshops before the launch. I had never crocheted in my life. Despite the friendly crowd assisting first-time crocheters, I did not manage to produce a single form during the three-hour workshop. However, the combination of experimental craft practice, community arts and mathematical modeling and a relatively traditional institution (although one with perhaps an idiosyncratic mandate having grown out of older disciplinary formations, combining applied arts and sciences) ignited my interest. What initially struck me as my uncoordinated fingers were caught up in a messy ball of knots was that these objects of crocheted coral did not have a secure, pre-made interpretative frame for themselves. They were not purely mathematical models, not just handicrafts, and they certainly could not be understood purely through the institutional frame of the Powerhouse as they had started their life far outside its walls. The crocheted figures also sat somewhat awkwardly as contemporary art. They could not be assigned to a sole creator and were easily replicable and clearly quickly multiplying. This chapter grew out of my interest in following the carefully constructed knots of this international collective. While my crocheting career did not go as planned, this chapter was born.

The IFF is a nonprofit educational organization that relies on selling memberships, sales of publications and exhibition fees to survive. Their most visible project continues to be the HCCR. The IFF's ability to continue the work of the reef depends on maintaining the intellectual property rights to the displays and the educational programming that has emerged from the confluence between coral, science, mathematics and crocheting. This is made possible through the positioning of the displays in contemporary art contexts, which is where the HCCR had been predominately displayed prior to *The Sydney Reef*. The reefs generally consist of variations on simple patterns emphasizing its craft heritage where the rules of contemporary art and its protocols of assigning credit to proper names is difficult to maintain.

The Director of the IFF, Margaret Wertheim, explains how very quickly "the project had taken on a viral dimension of its own, which got completely beyond us" (Wertheim 2009). While any exhibition of a satellite reef requires permission from the IFF, and as such may limit the sorts of institutions that could play host to this project, Wertheim's comments are an acknowledgement that the project seemed to take "on this inner organic life of its own . . . [which] morphed into this organic, ever-evolving creature" (Ibid). Werteim's observations about the reef's "inner organic life of its own" inspired the science and technology scholar Sophia Roosth to undertake ethnographic studies of the HCCR's production in order to consider its role in the construction and formation of contemporary biological knowledges (2012). Figures are not just inert reflections of other ideas. As Wertheim makes clear, the form itself evolves, the crocheted coral forms take on a life of their own.

Casting aside the issues of the preservation of the larger Reefs (both crocheted and biological), for a moment, I will turn to a discussion of the Powerhouse exhibition, which is just a fragment of a much larger story about the bigger constellation of activities produced through the IFF. In this way, like the fractal forms which are the most well-known examples of hyperbolic figures, the fragment and the whole are in a relation. Fractals are best described as self-similar patterns repeated at every observable scale (see Mandelbrot 1983). The larger project is continually evolving, just like true fractals which continue to grow in complexity with every division made as the patterns continue to repeat. Continuing with the fractal analogy, the whole is not fully determinable from the discussion of this instance—which would entail an over-valorization of the fragment. However, nor would it assign the fragment a lesser value as if it is only an offshoot from an original activity located elsewhere. Such linear assumptions of hierarchy do not apply when employing a fractal perspective. A perspective attuned to the complexity of fractals and the crenulated nature of hyperbolic space understands each part as worthy of attention and analysis, without suggesting any of it is determinable from its other parts. As such, this chapter is not an attempt to assign a particular value for the HCCR project in museums of the future, although I believe it is a significant cultural activity.

I want to think about *The Sydney Reef* through a framework that Deleuze might consider as "the universal and its appearance" (2001, 171), or as the queer theorist José Esteban Muñoz following Jean-Luc Nancy calls "being singular plural" (2009, 10). Paying attention to each time an instance of a larger category appears or is evoked was Deleuze's innovative solution to the long-standing philosophical problem of universals. While appellations of universals may appear stable over very long periods, close attention demonstrates how each instance is reworked and subject to change. Repetition of a universal following Deleuze's reworking of Nietzsche's "the eternal return" is never the same, rather it is the very condition for an unfolding of difference. So, while comments about this smaller local Reef may well apply

to the larger HCCR project and vice versa, this framework reminds us of the mediation and articulation that happens at different scales. I do this in order that at this smaller scale, it might become possible to imagine the contributions that small scale, agile projects and temporary alliances might make, especially when they become linked up with broader movements for social and ecological justice. In its modest singularity, the imaginative address of this exhibition suggested to me important ways museums might, and indeed already are, contributing to discussions around social change outside dominant linear narratives of cause and effect.

The Sydney Reef was the first to be exhibited in the institutional frame of a science museum, rather than the clear white cube setting expected of a modernist art gallery. The installation of *The Sydney Reef* was in a large, carpeted foyer on the lower levels of the museum. The coral reef forms were placed on small atoll-like plinths across the space. In this sense, the objects were not displayed as precious objects isolated from the surrounding space, the weave of the crocheted coral finding resonances with the weave of the carpeted floor underneath. On one hand, in displaying the work of a small artist's collective who engaged a whole team of community crochet artists, the Powerhouse did something no other institution or science center in Australia was doing: engaging with the world of community art collectives. However the exhibition of these beautifully crafted objects literally sat oddly in an institution not used to working with artists.

The exhibition provided an experience in which the museum was able to approach a variety of other issues (which is also common in the HCCR's activities). The walls of the exhibition hall held panels and projections about the work that contained information on coral reef degradation, the networks of people that were assembled to produce the coral reef as well as the mathematics behind the forms. A number of talks and workshops were arranged to coincide with the event, as well as practical workshops on crocheting and the social events of the collective. In this way, rather than the exhibition being the focus of the museum's activity, it was only one aspect of a much larger blended experience that spoke to a variety of different interest groups. This strategy allowed for a variety of personal investments in the program, according to individual interests.

The Sydney Reef was constructed of four rectangle ridges punctuated by five smaller square atolls. The five squares were arranged according to separate colors, blue-green, yellow, red and two white, while the longer formations were brilliant explosions of mixed colors. The number of forms seemed endless. In a video documenting the exhibition opening, a camera weaves between the displays showing audience members captivated and paused looking at the intricate details of individual forms.[7] The beauty of this crafted reef catches you by surprise. I have discussed this reef in an article addressing visual communication in museums and read it in relation to the American psychologist Silvan Tomkin's affect of surprise (see East 2014). Tomkin's theory of affect is grounded in psycho-biology and as such

provides a very different approach to models of affect that draw strictly on Deleuze.[8] However, emblazoned by a queer interpretative approach, such bricolage is tolerated. Tomkin's theory outlines neurologically distinct profiles: two positive; four negative; a resetting mechanism and two drive auxiliaries (1992). Through a process called scripting, people establish lasting patterns whereby different affects become wired with each other, in such a way that the setting of one affect is likely to follow another. Importantly, though, surprise retains its capacity to reset, as such any of the other affects are just as likely to follow its triggering (Tomkins 1992, 498). This ability to generate a blank slate is a powerful tool from which to shift framings of the future by disrupting previous feeling rules around the future.

The last atoll of the exhibition, closest to the exit point, is constructed entirely of artificial materials. In counterpoint to the remainder of coral forms that are constructed entirely of natural fibers, this reef speaks to coral degradation. Constructed from plastics bags, cassette tapes, insulated wires and all manner of human-made materials, this reef suggests the legacy of waste in natural reefs. The degradation of coral reefs stands in the popular imaginary as evidence of the catastrophic effects of environmental degradation (see Helmreich 2010). As Al Gore states in his Foreword to the recent World Resources Institute report *Reefs at Risk Revisited:*

> Coral reefs are harbingers of change. Like the proverbial "canary in the coal mine," the degradation of coral reefs is a clear sign that our dangerous overreliance on fossil fuels is already changing Earth's climate. (2011, v)

Here, changes in the world's coral are marshalled as one of the few pieces of certainty that environmental change is happening, that its effects are being felt. The predominate effect of warming on coral is episodes of bleaching, where the warming of ocean temperatures due to increased acidification kills the signature algae that colors the coral, exposing its white skeletons. What is striking about this atoll displaying potential futures in this exhibition is that it is not conveyed through the expected effect of climate bleaching that has been used to display the future scenarios at other iterations of HCCR, in Chicago for example. Rather, the reef's future is represented through an alteration to the material of the coral itself. This modification, rather than just a loss, is a transformation. It is a new ordering of seemingly waste and rescued materials. On first inspection, perhaps all that is noticeable is the extensive use of black in this atoll and its comparatively lower height. On closer inspection, it becomes clear how the artificial materials affect the forms: they are tighter, more rigid and less poetic than those of natural yarn. Yet they have their own charm, which is not that of traditional handicraft. These forms are not ordinary decoration—they were clearly made for this display. In this sense, this atoll is able to be read in contrast to the remainder of the display. It creates a sense of disjunction; if the natural fibers speak of

current coral formation then these forms project a sense of a future imaginary. However, in the same way that it is clear that the natural fibers are not coral, this future imaginary does not claim to project a particular future, rather it invites an imagining of the future. This is not a linear timeline of before (healthy colorful coral) and after (degraded coral).

The invention of form through the use of unexpected materials in the exhibition creates the possibility of a more complex timeline. It is worth remembering the formula that produces these hyperbolic forms. The transformation of these shapes is produced through additional stitches added in a pre-determined ratio. In the language of mathematics this is referred to as n+1, additional stitches are added to each row in a determined ratio, taking the pattern out of a straight two dimensions into other planes. Such a formula seems to get to the very essence of a queer project, in which alternative, additional ways of living are always a possibility and are actively sought out (Halberstam 2011, 2). With the addition of something new, different possibilities emerge and a more speculative approach to futurity is made possible. In this sense, this mass of brightly colored crotched fibers do a lot more than just represent coral, or even hyperbolic space.

This is made explicit by the seminal mathematician William Thurston who explains in the Foreword to mathematician Daina Taimina's book on hyperbolic crochet that these forms hold "fascination far beyond their visual appearance" (2009, ix). What is distinctive about the hyperbolic form is that it holds the possibility for complex new forms to emerge out of simple patterns. It is this force of creativity, which for Thurston exists equally in mathematics and design, which leads to the more-than-representational aspect beyond visual appearances.[9] In the next section, this more-than-representational function will be considered. This is done through a closer look at the work of figuration and some of the other possibilities that emerged alongside these crocheted forms. After discussing the work of figuration, the next section discusses this ephemeral exhibition as an aesthetic figure. Here, these carefully constructed knots lead back into the messy questions surrounding the nature of museum representations and their roles in social transformation. In doing so it provides me with a way to think through the contested nature of representation in the museum and leads to a way of thinking about change differently, not just as an endless progression to a utopian or dystopian future.

AESTHETIC FIGURES AND THE FUTURE

This section considers the work of aesthetic figuration in the reef works. The founders of the IFF are attuned to the border-crossings that figures do, cutting across their combined professional fields of science, art, curating and writing (see Weschler 2011). To think figuratively is to not be tied to writing about something. It is to be productive, in the language of hyperbolic

forms; it is the addition of "plus one" in a repeating pattern. As Deleuze and Guattari explain in *What Is Philosophy?* "figures have nothing to do with resemblance" rather they are "the condition under which the arts produce affects" (1994, 65). Deleuze and Guattari's text is primarily concerned with outlining three distinct (yet inseparable) modes for producing knowledge: philosophy, art and science. These are all opposed to the free-fall of chaos on the one hand and the certainty and fixity produced by fundamentalism, religion and opinion on the other. However, figures are not distinctive of the arts. Indeed, according to the argument in *What Is Philosophy?* all three domains have specific modes of figuring the world. The arts employ sensations and aesthetic figures, science employs figures and partial observers and philosophy uses concepts and conceptual personae (216). These different procedures of figuration are useful in discussing the work of figuration in the exhibition of *The Sydney Reef* and HCCR. The coral reef forms can be discussed as both a geometrical figure and as an aesthetic figure. As geometrical figures the reefs emphasize a representational function.

This representational function is the focus for anthropologist Stefan Helmreich's (2010) astute historical investigation of the ways that coral have been variously figured historically and in which he also considers the HCCR. Helmreich outlines three main formations in representations of coral: emergence, immersion and emergency. In the early writings in which coral emerges as entities for consideration, a focus on architecture and structure is identified. Helmreich characterizes twentieth-century accounts as immersive, attributing the shift in focus on the rising popularity of diving and snorkeling. Such experiences led to an emphasis on the insights that coral could provide to human existence. Relevant to my concerns here, Helmreich outlines a variety of work that investigated reproductive routines and gender roles of coral and other reef organisms and articulated these results in relation to human experiences of sexuality concluding this section by declaring "coral is good to queer with" (2010, 12). The final episteme sees a closer attention to coral as it begins to be read as a signal of environmental change and emergency, and it is here that the HCCR is discussed. While Helmreich's discussion is a lively reminder of how coral are woven into the worlds we create, there is less attention on how the HCCR operates as an aesthetic figure, on which I would like to specifically draw attention to two aspects. First, as outlined above, the figure in its aesthetic sense works through the combining of forces in different ways and brings them into new and different relations. Second, the aesthetic figure points toward the invention of something new. In order to think about these two features of aesthetic figuration I would like to turn to two other projects: a children's book and another sculptural form that emerged from the collective that produced *The Sydney Reef*. Thinking seriously about the exhibition's aesthetic figuration entails backgrounding the representational nature of these figures invoked in concepts such as models, and focusing on the role of this mass of crocheted coral in figuring new relations.

The first project to be discussed is a publication put together by the Powerhouse Museum entitled *A Maths Odyssey: Tracing a Line from Euclid to the Computer* (Connell and Whitty 2010). It is beautifully illustrated by comic artist Matt Huynh and specifically designed for high school students, with relevant math exercises in the back, complete with curriculum links and answers. The story constructs a narrative connecting developments in theoretical geometry with one of the most iconic technological developments in the second half of the twentieth century, the computer. As such interest and importance is created for the various crises in theoretical math by linking these crises to developments vital for the creation of computer logic. Here, social significance lends drama to the developments in knowledge about the characteristics of space or the changing relationship between mathematics and the external world.

The short narrative of *A Maths Odyssey* hinges on Janos Bolyai's reformulation of Euclid's parallel postulate. Bolyai was a Hungarian mathematician who became obsessed with his work on geometry. His father who had instructed him in Mathematics from a young age such that he had mastered calculus by the age of 13, wrote to him pleading: "For God's sake, I beseech you, give it up. Fear it no less than sensual passions because it too may take all your time and deprive you of your health, peace of mind and happiness in life" (cited in Connell and Whitty 2010, 22). Eventually, Bolyai's hard work paid off and he was able to write back to his father that "Out of nothing I have created a strange new universe" (Ibid., 24). What Bolyai describes here resembles the distinctive processes Deleuze and Guattari argue is the effect that the creation of new figures in the arts and sciences has: "they emancipate a particular level so as to make it into new planes of thought" (1994, 90). Bolyai describes it as a whole new universe, Deleuze and Guattari as an emancipation of a new level, which has the effect that "the nature of the references and projections change" (Ibid.).

Regardless of the metaphor used to describe the effect, the reformulating of Euclid's troublesome parallel postulate eroded apparent certainties that mathematicians had relied upon to model and describe the world around them. These certainties had led to a straightforward application of mathematical models that were (and continue to be) the basis of all manner of linear predictions. The direct application of such models of Euclidean geometry has constructed a rectilinear world. As the Wertheim sisters explain "the skyscrapers we work in, the gridlike arrangements of our streets . . . speak to us in straight lines . . . two thousand years of geometric training have engraved the grid in our minds" (2009, 147). The model has been reused so repetitively that it is forgotten that the model or figure itself still has an effect. What the Wertheim sisters are pointing to is a persistent habit in our perception of the world. Figures construct particular relations. Figures construct what is possible to see, understand. Having determined perception so thoroughly, these ways of understanding the world determine how we are able to represent it. This mode of seeing the figure as a stable

mimesis of reality is what Brian Massumi is suggesting when he says "the figure is an habitual inattention to the imperceptible in vision" (2011, 93).

In the world where Euclid's model was thought to be the only geometry, anything that did not fit the model was simply not seen. In the world that emerged following the questioning of Euclid's geometry a new plane of reference was established and here "there are no parallel lines and the angles of a triangle don't necessarily add up to 180" (Connell and Whitty 2010, 26). Things that were once imperceptible suddenly become perceptible. These new developments changed the whole relation between mathematics and the world; according to the Museum's storybook "the ground beneath the feet of every mathematician had shifted" (Ibid.). Change is often uncomfortable. Despite many attempts to tidy up Euclid's troublesome postulate, and to make certain the instability created by Bolyai's discoveries, "mathematics remained uncertain" (32). These developments did not have the earth-shattering effect many mathematicians worried would happen if the fundamentals of their discipline could not hold. As the story recounts, "no real buildings collapsed because of the shaky foundations of mathematicians" (34). This is because as Deleuze and Guattari explain, figures do have a reference however, they are "not defined by an external resemblance" (1994, 89). On one level (that of flat two-dimensional space) Euclid's figure explains the properties of straight lines. This explanation is only "true" if we do not pay attention to the imperceptible curve of space. This means that it is sufficient for most practical purposes. Instability is created when the creation of new figures makes other levels perceptible. This is what Donna Haraway has in mind in her understanding of the work of figuration. As Haraway explains:

> [f]igures must involve at least some kind of displacement that can trouble identifications and certainties. . . . Verbal or visual, figurations can be condensed maps of contestable worlds. All language, including mathematics, is figurative, that is, made of tropes, constituted by bumps that make us swerve from literal-mindedness. (1997, 11)

Figures provide the force to make us swerve from "literal-mindedness." Deleuze and Guattari refer to this as "*de*framing," whereby that which is known is confronted and returned to the complexity and chaos of the broader universe in order for new frames to be ceaselessly reframed and *de*framed again (1994, 187). As the short story makes clear, the instability created by the replacement of Euclid's figuring of space lead to developments that were essential to modern computing: "but it doesn't matter because it is the gap between the resolved and unresolved that leads mathematicians forward" (Connell and Whitty 2010, 40). Cited out of context this quote could suggest the story promotes heroic progression. Such a reading is complicated in the overall narrative of the storybook, which makes clear that mathematical developments are not always forward in a linear sense. For

example, mathematicians had to go back to Euclid's description of straight lines and revise them in order for new developments to emerge.

A child's storybook may seem an odd place to return to the question of queer time, however much of the discussion regarding temporality has been generated in relation to Lee Edelman's 2004 polemic, *No Future: Queer Theory and the Death Drive*. The figure of the child "with the hopes that get put in their outstretched hands and the dreams that get read in their always wide eyes" (Edelman 2004, 149) is the overloaded symbol repeated to restore a hopeful future. For Edelman the majority of contemporary political programs regardless of left or right, conservative or progressive, are reliant on assumptions that the social must be reproduced. Most central to these forms of politics is what he labels reproductive futurism. Against this prolonged hopefulness, Edelman challenges us to see the child differently: "as itself the nightmare of history from which we're helpless to awake" (149). This subversion of the child, from inspiring hopes and dreams, to the nightmare of endless deferment prompts Edelman to construct a figure of the queer.

The queer always stands to interrupt reproduction and hence disrupts the transmission and reproduction of meaning. In our storybook, through such a framework the museum may have been free to release a beautifully illustrated storybook on the social history of mathematical figures without the need to include exercises with direct links to the curriculum. Such a traditional pedagogy of transmission seems to leave no room for readers to produce their own meaning and use for the book. Against such desires to reproduce the same through closed exercises, Edelman constructs an imaginative approach to life. Not concerned with reproducing, the queer is released from the demands of determining a final or coherent meaning. With no recourse to any meaning besides the process itself, all we have to cling to is whatever enables one to go on living. This leads Edelman to claim "what is queerest about us, queerest within us, and queerest despite us is this willingness to insist intransitively—to insist that the future stop here" (2004, 30–31). Demanding the future stop here is not an escape from responsibility. The fear of environmental catastrophe cannot be avoided without looking squarely at our involvement and finding a way of living in such a present.

Such an interpretation of Edelman might seem compatible with the concern of another queer theorist Sara Ahmed in her book *Queer Phenomenology* (2006b). However, Ahmed takes issue with Edelman's thesis, drawing a distinction:

> I would not argue that queer has "no future" as Lee Edelman (2004) suggests—though I understand and appreciate this impulse to "give" the future to those who demand to inherit the earth, rather than aiming for a share in this inheritance. (178)

Appreciative and understanding of the desire to give up a future inheritance, Ahmed remains orientated and attached to the future. Against

Edelman's demand for "the future to stop here," Ahmed argues "instead, a queer politics would have hope" (178). Ahmed clings to hope, and in doing so this emotion is secured for the hard work of a queer politics. In Ahmed's reading of Edelman, having given over the future—hope is gone. Ahmed is playing a zero-sum game—each participant's gain or loss must be exactly balanced. In order to maintain hope we must demand our share (perhaps this might provide a partial explanation to insistent calls for hope (see Ahmed 2006a; Bloch 1986; Flannery 2005; Munoz 2009; Thrift 2004). In a psychological domain hope is comprised of two components, "goal directed determination" and pathways toward goals (Geraghty, Wood and Hyland 2010, 155). In my reading, Edelman advocates letting go of the first component of the goal toward a goal as process. In this reading, indeed feeling better is the means and the goal, and there are no shortcuts.

To be clear, the future that Ahmed is insistent on protecting is not the hope of reproductive futurism. Despite programmatic differences in political allegiances, reproductive futurism is committed to the reproduction of the same. Ahmed's future remains radically open:

> We have hope because what is behind us is also what allows other ways of gathering in time and space, of making lines that do not reproduce what we follow, but instead create new textures on the ground. (2006a, 570)

A politics and orientation to the surprising play of forms means that queer must itself be available to surprise, possessing no fixed stable ontology there is little guarantee for the production of queer knowledge. As Ahmed suggests: "queer is not available as a line that we can follow" (2006b, 179). Without a clear path Ahmed remains hopeful, because there is direction, orientation, not in the absolute space often assumed in the phenomenological school, rather in a lived, embodied, already wrinkled and fractured relative space and time that must be made, unmade and made again.

Donald Preziosi articulates queer politics most clearly in relation to the museology literature by taking aim at "everyone from Kant to Marx, Riegl to Freud, Adorno to Warburg, Habermas to Panofsky and Benjamin to Jameson," who according to Preziosi, construct the future as "the failure of the present" (2004, 275). Such an assumption regarding the failure of the present has led to an understanding of interpretation as:

> an innocent historical science, a "method" of historical inquiry about whose "framings" we can dispassionately "reflect" and fine-tune ad infinitum, our eyes set and mesmerized by the desire for a horizon of resolution that never does stop receding (and it is a good thing, too). (2004, 288)

Queer interpretation is performed not to resolve an issue, or to determine a final secure meaning, it is done in order "to change it" (288). It is in the

hope of such socially and environmentally just futures that queers remain invested in the future (see Hall 2014).

Bringing the search for such utopian ideals away from some distant future and toward the already-existing presence fostered in collective, community-oriented projects and practices such as the AIDS Quilt and international Hyperbolic Crocheted Coral Reefs might provide a suitable means of investment. Such movements have their own way of producing hope. A film recently funded through the online community Kickstarter, *The Last One* (2014, directed and produced by Nadine Licostie), documents such a moment in the history of the AIDS Quilt. According to the press materials for the film, "in 1987, a panel was delivered anonymously with no background, no instructions" which read "THE LAST ONE." The caretakers of the quilt have held on to this panel in the hope that one day this last panel might be sewn into the quilt, when the disease is finally eradicated. Through the practice of memorializing the names of those who have died, there emerges a future horizon; the last panel provides a continual focus and goal of the practice of memorializing.

The second project I want to discuss emerging from *The Sydney Reef* reuses some of the crocheted figures. It is a sculptural installation created in November 2010 by Claire Conroy, one of *The Sydney Reef* organizers. *The Collective Mind* uses the hyperbolic forms to construct a larger-than-life human brain. It is clear that this is not meant to represent a real brain. The collective is evoked here by the massing of different forms and colors, which almost miraculously combine to form a single image. Here hyperbolic space, with its ever diverging lines of thought, presents a particular process of thought. Creative thought spreads out in divergent directions, it is expansive. However, this is a divergence that simultaneously adds to the whole and ultimately enriches it. This figure is a collective assemblage that is neither restricted nor tied to tradition; it is not a replication of the same. Instead, this is an assemblage, which promotes innovation and deviation. As the artist explains on her website, "We will make it into a reef again but as we love the material so much we will keep creating new things with it" (Conroy 2010). The love of the material itself provided the impulse for this new (creative) form. This is very similar to the process described by the Australian painter and theorist Barbara Bolt when she talks about what happens to representation through practice:

> In the flux of practice, we grope towards an understanding that is not representational. Acts and decisions occur in the heat of the moment and not as the result of rational logic . . . rather we work in the "heat of the moment" and in relation to tools and materials to produce movement. (Bolt 2004, 50–51)

The movement in *The Collective Mind* is the creation of a new figure produced through working with materials. The movement traced in the museum's children's book was produced through the practice of a long line

of mathematicians who followed procedures in order to produce something completely unanticipated. The inventors of the HCCR concept, the Wertheim sisters, discuss this movement in a catalogue essay for an exhibition of the reef in a Platonic philosophical language as a convergence of "object" and "ideal" (2009, 155). The practice of figuration produces movement, it makes the imperceptible visible, makes us swerve from literal-mindedness. Focusing on two projects, which emerged alongside *The Sydney Reef,* this section has emphasized two characteristics of aesthetic figures. First their impressive valency, aesthetic figures combine easily when materials and ideas are brought into proximity with them, creating new forces. Second, these new forces point toward invention and imaginative possibilities, for as-yet-unimaginable futures. Aesthetic figures may produce new ways of experiencing, perceiving, thinking and ultimately living in the world. Queer figures remind us not to endlessly defer living and to look for alternative ways in the textures and knots of the everyday.

Aesthetic figuration as a process of joining together things, materials, people, movements and futures provides a challenging approach to change, which museums are well placed to adopt. By providing nondominant figures to understand issues or conjunctures, museums may intervene in common or habitual responses. Such an understanding brings its own challenges. For example, it requires innovation; it is inherently an inventive and experimental practice. There is no certainty it will be successful in advance. Bolyai did not realize his purely theoretical grappling with Euclidean geometry would lead to logicians proposing undecidability; nor did modern computing follow seamlessly from decidability. At each step it may have gone in innumerable other directions. While the climate change literature is beginning to pay attention to how the phenomenon is visualized in communication, how images operate in shifting the terms of debate is an urgent matter (see Doyle 2007; O'Neill and Nicholson-Cole 2009; and O'Neill and Smith 2014).

FIGURING IMAGINATIVE FUTURES

This chapter has focused on temporary projects of stitched-together reef forms, arguing that the HCCR knits together a complex entanglement of issues. Starting from community initiatives, which intervene visually in climate change and the AIDS epidemic, this chapter has provided a discussion of aesthetic figuration. Specifically, such forms do not simply represent or reflect the issues. The AIDS Quilt provides solace and comfort to those mourning the lives of their loved ones in the hope that no more will die. The *Hyperbolic Crochet Coral Reef* provides endless fascination and possibilities for interest and investment in craft, mathematics, art, science philosophy and/or climate change. Clearly, *The Sydney Reef* did not attempt to convince us that the future would consist of crocheted cabled reefs; rather

it sought to convey a sense of futurity, rather than to simply represent the future.

In moving beyond a literal representation of the future, these knots of various threads figure as engagements that specifically create worlds, rather than simply reflecting or representing. The vibrancy of the colors may provide a similar experience to the full absorption of interest experienced when diving among a coral reef, but this interest floats on to other things. The work provided the Powerhouse with an opportunity to run events on a range of topics, expanding the focus out from crocheting to more abstract concerns such as the impacts of climate change on coral and non-Euclidean geometries. The importance and urgency of this creative drive, in current cultural contexts, creates what Felix Guattari describes as "auto-enriching" processes, which constantly work to rupture meaning, suggesting that "poetry today might have more to teach us than economic science, the human sciences and psychoanalysis combined" (1995, 20–21). My consideration of the narrative in a museum's book for children, led to a consideration of queer futures, which emphasized a resistance to a reproduction of the same. Museums seeking to engage themselves with the important issues of today, such as climate change, should understand the urgent need for modes of experimental thought, which hold the possibilities for new and different ways of living. This is a politics of the making—it must be constructed. It is not ready-made—although the pattern may be there.

This chapter has brought together an odd assortment of things: coral, quilts, books, children, collective minds and museums. It has done so to trace the movement of affect that is produced when thinking about these things aesthetically. This movement may drive us toward representation of issues or futures, while always reminding ourselves it can be otherwise. Aesthetic figures, and the affects they mobilize, generate new forms (children's books, unorthodox mathematical textbooks, chapters on museums, new displays from materials) as they are brought into contact with other forms (encounters with museum space, patterns of hyperbolic geometry, social activism). Affect, the force aesthetic figures make, can create a crenulated space, where politics has room to move.

Museum affects may be useful tools to create change. However, exhibitions cannot be reduced solely to their content or messages. The content is part of a larger field, which through this perspective becomes an ecology of potentiality. The theorist and former dancer Erin Manning discusses this as the work's "capacity to dislodge the you that you thought you were. It's the how of the work's capacity to shift the very ground that continues to move you" (2012, 57). As our tale of the computer's invention relied on shifting ground for innovation, new political forms and approaches can only be developed by active experimentation, a ceaseless commitment to creative and inventive living. As we begin to let go of previous certainties, an active passage from production to reception is created, beyond generational exchange. Such a view refuses to see audiences (children) as

passive recipients of information (inheritance). These international cultural practices of quilting and crocheting coral, which have weaved inside and outside all kinds of museums, arts centers, schools and community halls reframe issues imaginatively. A queer analysis pays attention to the subtlety and indirectness of artistic approaches and considers the roles they are playing in reformulating our world, hopefully, beyond only mourning and militancy.

NOTES

1. For further information on the IFF, see www.theiff.org/
2. For a full list of exhibitions, as well as satellite reefs, as they are known, including future planned exhibitions, see the HCCR website: http://crochetcoralreef.org/exhibitions/
3. The Powerhouse Museum accepted the donation of the Australian version of the AIDS Memorial quilt in 2007. The Names Foundation is the nongovernmental custodian of original AIDS Memorial Quilt in the US and maintains accountability for outreach and conservation. In a 2012 interview the Director of the IFF raises the "overwhelming responsibility . . . of what will happen to all this work in the long run. Will it all sit in boxes in a storage unit, or will it find a home?" (Weschler 2011, 66).
4. While such a concept pre-dates the queer studies approach I just evoked, and has some important differences, Cvetkich refers to Deleuzians as "intimates and fellow travelers" (2012, 4). Indeed Deleuze himself referred to his method as "taking authors from behind" (1995, 6), and as such I find them compatible interpretative frames in this context.
5. *In Stitches* was the work of Michaela Davies, Charlotte Haywood and Claire Conroy.
6. The Museum's 2020 vision suggests a strengthening of the MAAS branding. www.maas.museum
7. See http://sydneyreef.blogspot.com.au/
8. For a comprehensive discussion of different understandings of affect see Gibbs 2002; Gregg and Seigworth 2010; and *Sedgwick and Frank 1995; Wetherell 2012*.
9. The more-than-representational is a term developed by the cultural geographer Hayden Lorimer (2005) in response to Nigel Thrift's work on Non-Representational Theory (see especially 2008) as he believes it provides a more accurate signal to the role of representation, which we can never really escape from.

REFERENCES

Ahmed, Sara. 2006a. "Orientations: Toward a Queer Phenomenology." *GLQ: A Journal of Lesbian and Gay Studies* 12(4): 543–574.

Ahmed, Sara. 2006b. *Queer Phenomenology: Orientations, Objects and Others*. Durham, NC: Duke University Press.

Bloch, Ernst. 1986. *The Principle of Hope*. Cambridge, MA: MIT Press.

Bolt, B. 2004. *Art Beyond Representation: The Performative Power of the Image*. New York: I.B. Tauris & Co.

Cameron, Fiona and Linda Kelly, eds. 2010. *Hot Topics, Public Culture, Museums*. Newcastle, UK: Cambridge Scholars Publishing.
Cohen, Patricia. 2008. "Want to Save a Coral Reef? Bring along our Crochet Hook." *New York Times,* March 8. www.nytimes.com/2008/03/04/arts/design/04crochet.html?_r=0
Connell, Matthew and Helen Whitty. 2010. *A Maths Odyssey: Tracing a Line from Euclid to the Computer.* Sydney: Powerhouse Museum Publishing.
Conroy, Clare. 2010. "The Collective Mind." *Pocket In The Sky.* http://pocketinthesky.blogspot.com.au/2010/11/collective-mind.html
Crimp, Douglas. 1987. "AIDS: Cultural Analysis/Cultural Activism." *October* 43: 3–16.
Crimp, Douglas. 1989. "Mourning and Militancy." *October* 51: 3–18.
Crimp, Douglas. 1993. *On the Museum's Ruins*. Cambridge, MA: MIT Press.
Cvetkovic, Ann. 2012. *Depression: A Public Feeling*. Durham, NC: Duke University Press.
Deleuze, Gilles. 1995. *Negotiations 1972–1990*. New York: Columbia University Press.
Deleuze, Gilles and Félix Guattari. 1991/1994. *What Is Philosophy?* London: Verso.
Doyle, Julie. 2007. "Picturing the Clima(c)tic: Greenpeace and the Representational Politics of Climate Change Communication." *Science as Culture* 16(2): 129–150.
East, Scott. 2014. "Figuring Change: Visual Communication in Museums." In *Researching the Visual: Demystifying "The Picture that's Worth a Thousand Words,"* edited by Vaughan Rees and Arianne Rourke, 210–227. Champaign, IL: Common Ground Publishing.
Edelman, Lee. 1989. "The Plague of Discourse: Politics, Literary Theory, and AIDS." *South Atlantic Quarterly* 88(1): 313–314.
Edelman, Lee. 2004. *No Future: Queer Theory and the Death Drive*. Durham, NC: Duke University Press.
Flannery, Tim. 2005. *The Weather Makers: The History and Future Impact of Climate Change.* Melbourne: Text Publishing.
Geraghty, Adam W. A., Alex M. Wood and Michael E. Hyland. 2010. "Dissociating the Facets of Hope: Agency and Pathways Predict Dropout from Unguided Self-Help Therapy in Opposite Directions." *Journal of Research in Personality* 44: 155–158.
Gibbs, Anna. 2002. "Disaffected." *Continuum: Journal of Media and Cultural Studies* 16(3): 335–341.
Gore, Al. 2011. "Foreword." In *Reefs at Risk Revisited,* edited by Lauretta Burke, Katie Reytar, Mark Spalding and Allison Perry. Washington, DC: World Resources Institute.
Gregg, Melissa and Greg Seigworth. 2010. *The Affect Theory Reader.* Durham, NC: Duke University Press.
Guattari, Félix. 1995. *Chaosmosis: An Ethico-Aesthetic Paradigm.* Sydney: Power Institute.
Halberstam, Judith. 2011. *The Queer Art of Failure*. Durham, NC: Duke University Press.
Hall, Kim, Q. 2014. "No Failure: Climate Change, Radical Hope, and Queer Crip Feminist Eco-Futures." *Radical Philosophy Review* 17(1): 203–225.
Haraway, Donna. 1997. *Modest Witness@Second_Millenium. FemaleMan Meets OncoMouseTM: Feminism and Technoscience*. New York: Routledge.
Helmreich, Stefan. 2010. "How Like A Reef: Figuring Coral, 1839–2010." *Party Writing for Donna Haraway, a Webfestschrift,* edited by Katie King. http://reefhelmreich.blogspot.com
Hooper-Greenhill, Eilean. 2007 "Education, Postmodernity and the Museum." In *Museum Revolutions: How Museums Change and Are Changed,* edited by Simon

J. Knell, Suzanne MacLeod and Sheila Watson, 367–377. New York: Routledge: London.

Knell, Simon, Suzanne MacLeod and Sheila Watson, eds. 2007. *Museum Revolutions: How Museums Change and Are Changed*. New York: Routledge.

Lorimer, Hayden. 2005. "Cultural Geography: The Busyness of Being 'More-than-Representational.'" *Progress in Human Geography* 29: 83–94.

Mandelbrot, Benoit. 1983. *The Fractal Geometry of Nature*. New York: W.H. Freeman and Company.

Manning, Erin. 2012. "A Conversation: Michael Hardt, Craigie Horsfield, Erin Manning, Brian Massumi and Andrew Murphie." In *All Our Relations: 18th Biennale of Sydney, Biennale of Sydney,* edited by Catherine de Zegher and Gerald McMaster. Sydney: Biennale of Sydney.

Massumi, Brian. 2011. *Semblance and Event: Activist Philosophy and the Occurrent Arts*. Cambridge, MA: MIT Press.

Muñoz, José. 2009. *Cruising Utopia: The Then and There of Queer Futurity.* New York: New York University Press.

O'Neill, Saffron and Sophie Nicholson-Cole. 2009. "'Fear Won't Do It': Promoting Positive Engagement with Climate Change through Visual and Iconic Representations." *Science Communication* 30: 355–379.

O'Neill, Saffron and Nicholas Smith. 2014. "Climate Change and Visual Imagery" *Wiley Interdisciplinary Reviews: Climate Change* 5: 73–87.

Prezosi, Donald. 2004. "Visual Culture, Transvestiture and Political Catastrophe (Or, So Is Art Queer, Then?)." *Journal of Visual Culture* 3(3): 275–290.

Sandell, Richard. 2002. *Museums, Society, Inequality.* New York: Routledge.

Sedgwick, Eve Kosofsky and Adam Frank, eds. 1995. *Shame and its Sisters: A Silvan Tomkins Reader.* Durham, NC: Duke University Press.

Taimina, Daina. 2009. *Crocheting Adventures with Hyperbolic Planes*. Wellesley, MA: AK Peters.

Tomkins, Silvan Solomon. 1992. *Affect, Imagery, Consciousness*. New York: Springer.

Thrift, Nigel. 2004. "Intensities of Feeling: Towards a Spatial Politics of Affect." *Geografiska Annaler* 86: 57–78.

Thrift, Nigel. 2008. *Non-Representational Theory: Space, Politics, Affect*. London: Routledge.

Wertheim, Margaret. 2009. "Margaret Wertheim: The Beautiful Math of Coral." *TED Talk*. www.ted.com/talks/margaret_wertheim_crochets_the_coral_reef.html

Wertheim, Margaret and Christine Wertheim. 2009. "Object and Ideal: A Mathematical History of Hyperbolic Space." In *The Quick and The Dead,* edited by Peter Eleey, 147–155. Minneapolis, MN: Walker Art Centre.

Weschler, Lawrence. 2011. "Interviews with: Margaret and Christine Wertheim." *The Believer* 2(2011): 58–66.

Wetherell, Margaret. 2012. *Affect and Emotion: A New Social Science Understanding*. London: Sage.

Programming Interlude IV Under the IceCap

Sonic Objects and "BioLogging"

Nigel Llwyd William Helyer and Mary-Anne Lea

Under the IceCap is an art and science collaboration between artist Nigel Helyer of Sonic Objects; Sonic Architecture (www.sonicobjects.com); marine scientist Dr. Mary-Anne Lea of the Institute for Marine and Antarctic Studies, University of Tasmania; and Dr. Andrew Legg, director of the Conservatorium of Music (UTAS) that aims to illuminate the fundamental connection between human activities and planetary dynamics by creating experimental installations and performance works that visualize and sonify scientific and statistical datasets. In essence, *Under the IceCap* combines complex environmental bio-logging datasets collected by southern elephant seals on their Antarctic under-ice dives and open ocean transits with economic and climatic data to produce an array of 4D cartographic animations, graphical scores, sonifications, live performative and sound-sculptures.

The tagline for the Institute of Marine and Antarctic Studies is "Turning Nature into Knowledge." The *Under the IceCap* project supplies a second line, "Turning Knowledge into Culture," encapsulating a powerful art and science synthesis and simultaneously raising the expectation, and the risk, of the endeavor. The primary aim is to produce a *third term,* creative works that fuse scientific and artistic disciplines, which are compelling and *affective* but simultaneously works of scientific *utility,* tapping into both sides of the brain Our key focus is the relationship of the environmental knowledge generated from Antarctic bio-logging data with the Anthropogenic changes in the biosphere and the ability to effectively render this knowledge in the public sphere.

Science is constrained by objectivity and impartiality, art is constrained by subjectivity and partiality. Both disciplines experience similar difficulties in establishing effective communication with either the public at large or the structures of governance and policy. The *Under the IceCap* core team is committed to exploring the environmental, social and political issues that are currently transforming our biosphere, and they are experimenting with radical means of expressing "hard" scientific research as cultural production that can render this knowledge into a broader cultural discourse.

SOME BACKGROUND

Thus far, *Under the IceCap* has proceeded in three broad stages. The initial seeds of our collaboration were planted during the Fourth International Conference on Bio-Logging held at the University of Tasmania, Hobart during March 2010, when we created an interactive sonic-map from satellite bio-logging data collected from tagged marine species in the sub-Antarctic (Heard, Davis and Kerguelan Islands). Environmental audio recordings of various species were accurately positioned on the digital map and convolved with their associated bio-data to form a hybrid data-music, a fusion of both the acoustic and data profiles. Participants were invited to explore the map and generate the soundscape in real-time.

From this point we realized that the extremely complex environmental datasets, in particular those collected by southern elephant seals,1 represented a formidable interpretive challenge. Tagged southern elephant seals can dive to 2,000 meters below Antarctic ice, and transit up to 3,000 kilometers across the Southern Ocean, transmitting vital oceanographic data each time they surface. Our challenge has been to develop novel methods of manifesting the data and inventing creative forms able to engage public awareness and initiate debate.

Our solution was to work with a group of gifted improvisation musicians from the Tasmanian Conservatorium of Music2 on the premise that

Figure IV.1 Southern elephant seals (*Mirounga leonina*) equipped with a satellite-relayed data logger (SRDL) in Antarctica. Photo: Clive McMahon.

musical training provides a unique set of skills such as dynamic and intuitive responses, collaborative behavior and strong interpretive abilities. The musically trained mind should, we reasoned, be perfect for pattern recognition and interpretation.

This posed a new set of possibilities and challenges, in terms of how to visualize and structure data so that it could be translated into music, not algorithmically but by live performers interacting with our bio-data–animated graphical scores and dynamic cartographical displays.

Anything in the Universe that Has Been or can Be Given a Graphic Representation Is a Possible Notation for Music[3] [Auq21]

The outcome was a series of highly successful concerts, with music generated in direct response to large-scale data projections of data-maps and graphical scores that encode the deep structures of the Southern Ocean, the engine of our climate. But as they say, this is merely a drop in the ocean. The central question remains, "How can we understand information about our environment in a radically different manner and how can we communicate this difference to both generalist and specialist audiences; in the hope that the environmental issues at stake are bought to the foreground?

The next stage of *Under the IceCap* is a radical development of our previous collaborative work and while the philosophical aims remain consistent

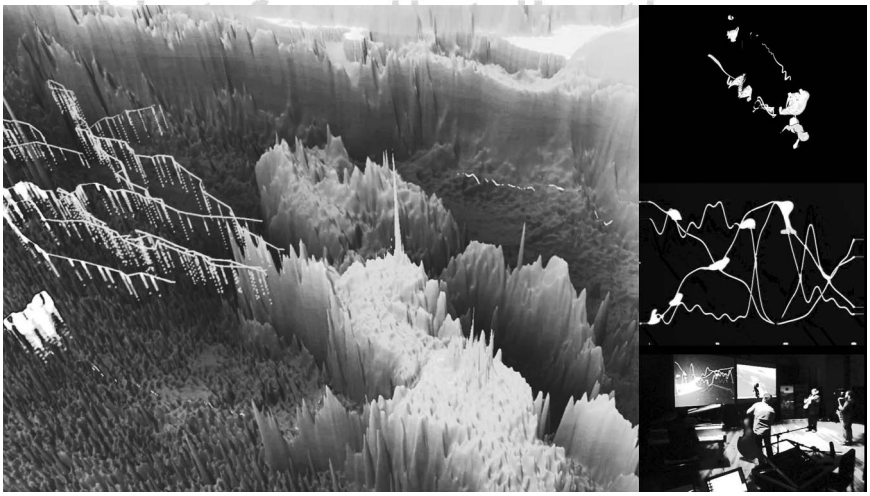


Figure IV.2 3D datastream created in Eonfusion of elephant seal migration patterns and concurrently derived environmental data using SRDL tags used in the "Under the IceCap" performances, in collaboration with the Conservatorium of Music, University of Tasmania. Photo: Mary-Anne Lea (IMAS, UTAS).

with the earlier manifestations, the aesthetic scope, methodology and modality have been redefined to encompass an expanded palette, to include spatialized sound-scapes and data-projection installations, and expanded live performances.

These include both live sound (vocal, choral and live instruments) and digital sound, and are structured to embrace a range of data interpretation techniques, including sonification engines that transform data directly into audio; convolution engines that modulate ambient and field audio recordings with data profiles to produce a hybrid data-music; transcription into traditional musical notation from charted data-profiles and the transcription of data to electro-mechanical instruments such as a disklavier piano. The performances will hybridize electro-acoustic techniques with both animated graphical scores and conventional notational forms, the latter facilitating a musical engagement with choral and chamber groups.

The aesthetic components of the installation will include 3D dynamically spatialized audio; with a focus on Geophony, Biophony and Anthrophony4 and references to early data-controlled music machines (which pre-figured contemporary computing and data-analysis) operated by punch paper, a very palpable form of graphical score.

There Are Three Kinds of Lies: Lies, Damned Lies and Statistics[5]

Ever mindful of Disraeli's words, these works will form a confluence of biological data, economic and climate data, and attempt to draw parallels (if not conclusions) about the very strong relationships between human economic activities and our changing biosphere. Our task is to illuminate the resonances and dissonances in these data flows so that the audience can begin to discover recurring patterns at a global scale.

NOTES

1. Mirounga leonina
2. Andrew Legg, Alistair Dobson, Nick Hayward and Glen Hodges—aka iCon.
3. Cornelius Cardew, "Wiggly Lines and Wobbly Music," Studio International, Art and Experimental Music (November/December, 1976): 251.
4. These are terms used in Acoustic Ecology: Geophony, the sounds of the Earth, Atmosphere and Oceans; Biophony; sounds of living beings; Anthrophony; and man-made sounds.
5. Attributed to the nineteenth-century British Prime Minister Benjamin Disraeli (by Mark Twain).

Programming Interlude V Adaptation

Cecelia Cmielewski

The lead character in the *Adaptation* exhibition is Lake Clifton, in the Yalgorup National Park, Western Australia, where one of the only living colonies of thrombolites can be found. Thrombolites, sometimes called the stepping stones of life, are neither plant nor animal. The living, growing rock-like formations in Lake Clifton (south of Mandurah) are 2,000 years old and directly descended from the earliest known forms of life on earth. Thrombolites once dominated Achaean seas (3.8 billion to 2.5 billion years ago) but now survive in only a handful of places on the planet.

In 2008, SymbioticA (the research laboratory for biological arts at The University of Western Australia) began a multiyear ecology and art project in partnership with the Mandurah City Council.

The challenge of artistic responses to environmental concerns is to go beyond the didactic or the descriptive. The role of the artist is multifaceted and often debated, in the case of *Adaptation,* artists generated opportunities for discussions that may not otherwise have happened across communities. The artist's role is not to necessarily solve the problem, but can stimulate greater curiosity and awareness to encourage active engagement by community members. Artists are realists as well, and, hand-in-hand with generating inquisitiveness, is the accompanied salutary awareness of any effect of their artistic gestures.

Throughout the research phase of *Adaptation,* SymbioticA provided the artists-in-residence with options for artistic interpretation through scientific biological methods, both in the field and in the laboratories at UWA.

Despite being in the largest conservation reserve in the Swan Coastal Plain in Western Australia, the existence of the Lake Clifton thrombolites (aka microbiolites) is threatened due to the proximity of residential development, agricultural run-off and climate change.

> Microbiolites are built by a community of microorganisms, predominantly cyanobacteria. Microbialites provide the oldest fossil evidence of life on Earth and are valuable indicators of past environments as they hold information of the environment in which they existed. Microbial communities have the ability to photosynthesize and have been attributed with creating the atmosphere we know today, as oxygen

> photosynthesis would also have increased free oxygen content in the earth's atmosphere. (Alexander 2012, 8)

Lake Clifton is also an important place in Indigenous knowledge, especially as the lake is a traditional Indigenous women's place. Annamaria Weldon, a poet and one of the artists-in-residence, had spent time with the traditional owners as part of her research, and I approached her to record an interview with custodian Auntie Gloria Kearing. As far as I am aware this is one of the rare, if not only, written descriptions of the Indigenous relationship to this lake and surrounding areas.

> The artist Gloria Kearing, known respectfully as Auntie Gloria among Bindjareb people, told me that Nyungar creation stories are powerful teachings that discourage their youngsters from damaging the environment, or coming to harm themselves. For thousands of years, when Mandjoogoordap's[1] indigenous people literally depended on the health of the river system and water bodies for wellbeing and survival, they learned conservation and interdependence at an early age. As her nephew George Walley recounts in the film *Barragup Yarns,* an Indigenous history film project (2012), little children were told that the fringing reeds of lakes like Lake Clifton, rivers and swamps were "the Wagyl's whiskers, so you leave them alone." They treated this vital buffer zone with appropriate caution, staying clear of quicksands, leaving healthy vegetation to filter run-off and provide shelter for snakes, frogs and all the other creatures vital to an ecosystem or food supply. . . .
>
> In Bindjareb tradition the female creation serpent, coming through and creating the estuary and all waterways linked to it, left her eggs at Lake Clifton. Cultural law included strong warnings against disturbing the beds of rivers and lakes. "They are made by the great female Wagyl, it's where she went, part of her journey, making everything," Gloria explained. "So that if anyone interfered with the river, pushed things into the lakebed, or dug them up, someone of their family could expect to fall ill." (Weldon 2012, 10–11)

Included in the exhibition is Carmel Wallace's photographic series, *Visualising Adaptation: Surface and Beyond*. Her work, at the microbial level using microscopy, investigates the structures of the thrombolites. It also includes studies of water samples from the lake, which have evaporated on the slide, enhancing the crystalline structures and microorganisms. Her microscopic image of the water droplet can be read as a poetic visual metaphor for the run-off into the lake from surrounding areas, one of the most contentious issues facing the farmers and residents living close by.

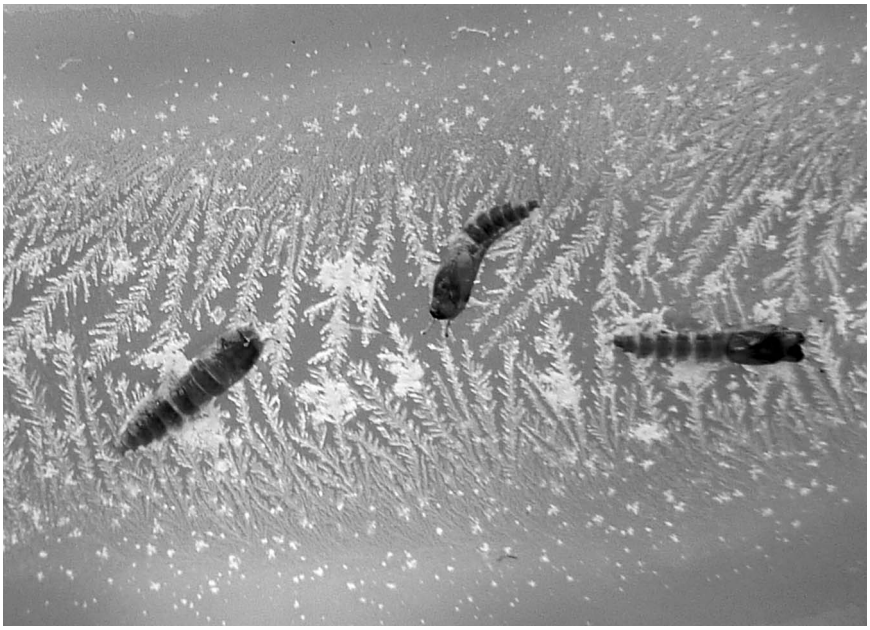


Figure V.1 "Carmel Wallace, *Lake Life* #1, 2010. Study of a water sample from Lake Clifton after evaporation. Photo: Carmel Wallace, 2010.

The exhibition, first shown at INQB8 Gallery, is available through Art On the Move whose virtual tour can be viewed at www.artonthemove.com.au/virtual_tours/adaptation/Adaptation.html.

The artists' works included in *Adaptation* are: Art Orienté Objet, *Plutôt que tout;* Oron Catts, *The Autotroph;* Galliano Fardin, *Yalgorup;* Gloria Kearing and Rob Ewing, *The River of Spirits;* Catherine Higham, *14 Mile Brook, Congelin Creek* and *Upper Crossman* series; Perdita Phillips, *cusp (The Sixth Shore*); Vyonne Walker, *Slowest Growing Sculpture;* Carmel Wallace, *Lake Life* #1–7; Annamaria Weldon, *Sharing the Edge*.[2]

NOTES

1. Traditional Indigenous name for Mandurah.
2. *Artist credits*:
   - Art Orienté Objet, *Plutôt que tout* (*More than everything*), 2012, HD video, also in Space(d) Art Out of Place.
   - Oron Catts, *The Autotroph*, 2010, solar still.
   - Galliano Fardin, *Yalgorup*, 2011, oil on canvas.
   - Gloria Kearing and Rob Ewing, *The River of Spirits*, 2000, acrylic.
   - Catherine Higham, *14 Mile Brook*, *Congelin Creek* and *Upper Crossman* series, 2010–2011, digital images. *Still Life*, 2010, HD video.

- Perdita Phillips, *Cusp (The Sixth Shore)*, 2012, floor sound work.
- Vyonne Walker, *Slowest Growing Sculpture*, 2012, sculptures.
- Carmel Wallace, *Lake Life* #1–7, 2010, Digital photographs; *Lake Life* 2010–2012, HD video.
- Annamaria Weldon, *Sharing the Edge*, 2009–2012, Limited edition book, digital photographs.

REFERENCES

Alexander, Jane. 2012. "The microbial communities of Lake Clifton." In *Adaptation*, SymbioticA, 8. The University of Western Australia.

Weldon, AnnaMaria. 2012. "Wagyl Noorook." In *Adaptation*, SymbioticA, 10–11. The University of Western Australia

Programming Interlude VI How the Open Web Performs Socio-environmental Crisis

Mauricio Corbalan

On the southern border of Buenos Aires, a small river called the Riachuelo has been heavily polluted for over two centuries by tanneries, slaughterhouses and petrochemical industries. It has become a dump site, a dead river without biological activity. The river basin covers an area where almost five million people live, half a million of them in slums. The lack of proper sanitation systems has converted the river into an open-air sewer. This scenario reflects the global phenomenon of climate change, but its most dramatic effects are felt at the local level. The change in rainfall regimes during the last two decades means that 1.5 million people living in territories that are below five meters of sea level, will face the risk of major floods in coming years. Climate change appears in the basin as spatial segregation of those inhabiting potential flood areas.

In 2008, a ruling of the Supreme Court of Argentina obliged to the newly created basin authority to begin the restoration of the river and address the welfare demands of affected communities. Progressive goals were set to reduce pollution and introduce a public information system with accurate, clear, and accessible data.

Que pasa, riachuelo? (quepasariachuelo.org.ar) is a monitoring platform designed to encourage local organizations, activists and journalists to become key players in monitoring the basin and keeping the issue on the public agenda. The platform is based on a methodology of complex scenarios designed by m7red.org and has been developed since 2011 by Mauricio Corbalan, Davo Galavotti, Damian Janowski, Eduardo Mercovich, Christian Parsons, Pio Torroja and Dario Wainer at GarageLab (garagelab.cc), a hacker space in Buenos Aires oriented to the resolution of high impact problems within a community of multidisciplinary experts.

In the past decade web technologies of geo-localization and peer production have offered means of distributing information at local levels and enhancing people's participation in public agendas. Peer production in the global north relies on the power of government agencies to produce big and reliable datasets. In the global south, public datasets, if available, are disclosed only after hard negotiations with government agencies. Even if you get free access to them, their sustainability is not guaranteed along

the long time span of socio-environmental crises, unstable political situations and erratic data policies. This apparent information inconsistency helps us understand the specific conditions of data production in a socio-environmental crisis. Since huge datasets are changing all the time and governments are managing open data as a public service, open data is no longer just another standard with which to comply. Stakeholders can use, remix or produce data on their own.

The need for scientific evidence to inform environmental policy decisions is more urgent than ever. But the translation of scientific evidence both for policy and society needs new open standards that shouldn't be set by experts alone. Access to scientific data on the part of publics and communities remains a field full of obstacles. The rise of closed formats such as social networks does not help. A web platform that addresses the complex dynamics of socio-environmental conflict must manage heterogeneous data and different information sources, and is thus in need of interoperable formats. Perhaps such monitoring of socio-environmental crisis can provide a model for the opening of science in the coming decades.

Socio-environmental conflicts present an opportunity to bring together science, society and the web. Why? At the root of these conflicts the demand for scientific evidence is tightly knitted with the concerns of grassroots organizations. Interest groups compete for attention to promote one piece of scientific research as more important or interesting than another, while media adds noise and confusion by spreading news according to corporate strategies. It is sometimes difficult to understand documents promoted by experts or the media as elements embedded in a conflict. There is a lack of tools for understanding the different stakes of actors who intervene in a crisis. Monitoring platforms allow the assembly of information in ways that enable a collective to narrate a conflict in a contested way.

Both communities and governments need to develop scientifically based documentation for taking decisions at socio-environmental conflicts. But what happens when governmental agencies have insufficient data, for example, about the health impact of pollutants? Web based monitoring platforms can mediate by setting up networks and crowd-sourced data from community-made health surveys and epidemiological maps, and compare these reported health impacts to the known health effects of pollutants. But this collective composition of evidence needs interoperability standards compatible with those of scientific research.

Systematic reviews of the documents that define problems from a scientific point of view are the foundation of all evidence-based work in the environmental sector. But from a territorial approach, witnessing an environmental crisis is the first level of evidence. Stories of socio-environmental conflicts only constitute evidence if they are assembled by many voices and entities. A monitoring platform builds up an evidence-based storyline of conflict. Composed of geo-referenced data, territorial reports and local media news, this is what we call a "crisis narrative."

Openness extends its influence beyond the code of open web formats. It is a way of thinking that frames new political procedures. We are producing so many apps that remain useless. It would be better to spend time and energy building up communities around certain datasets. We understand this as a statement for web ecology co-developed with stakeholders on the ground. This means encouraging communities to make use of the resources of the open web as a toolbox for political representation and action.

Que pasa, riachuelo? seeks to start a process across the open web ecosystem to define standards through which to conduct socio-environmental conflicts. This process of collective composition needs interoperability standards compatible with those of scientific research. The aim is not simply to impact upon the production and distribution of scientific knowledge but also to test the trust between scientists, the public, and the open web. In this sense, openness is not a political end in itself but a technique with which to reconfigure the relation between governments, experts and communities in ways adequate to the contested politics of socio-environmental crisis and climate change.

14 Conclusion: Climate Change Engagement

A Manifesto for Museums and Science Centers[1]

Fiona R. Cameron, Bob Hodge and Juan Francisco Salazar

INTRODUCTION

Museums and science centers are emerging as key players in climate change action. They have unique communicative, affective and social qualities and promote inter-generational learning outside the classroom. All these characteristics and activities can be purposefully deployed and critically developed to enable them to have agency in climate change governance in many different ways. In contrast to more politically defined sectors, research indicates that museums hold a unique position in the media and political landscape as trusted information sources, second only to science organizations and way ahead of the mainstream media and government as places to communicate climate science and raise awareness of climate change (Cameron et al. 2009). Museums are also one of the few civic venues in Western societies where strangers can gather (Gurian 2005, 31–37). They are perceived by audiences as impartial, "safe," places that increasingly enable conversations and social interactions (Gurian 2005; Sandell 2007; Cameron 2007). For many, they are powerful places to challenge and change views on social issues, as long as visitors can engage them on their own terms (Kelly 2006). The ability of museums to provide sensorial or affective experiences through the agency of objects and immersive experiences can also facilitate an active role on the part of audiences in co-creating narratives around climate change (Witcomb 2010). Social media has also opened up new, exciting opportunities for the museum sector to network and dialogue with broader communities and engage diverse interests and points of view (Russo et al. 2006) across vast distances, beyond the museum walls, and become part of new conversations and decision processes on the topic of global warming.

Yet messy problems such as climate change pose a whole new set of challenges for museum institutions in their ongoing struggle to be relevant and purposeful in a contemporary world, due to the many ambiguities, complexities and uncertainties, and the scale and pace of the phenomenon. This concluding chapter deals with the achievements of this sector, and new opportunities that could be grasped by dynamic institutions. At the same time, this review encourages the sector to recognize the unevenness of these developments, and

the problems that still impede progress. Many of these problems and solutions are similar to those in other sectors seeking to affect attitudes and policies toward climate change. This fact hopefully will only add to the value of this review for other sectors as they grapple with analogous problems.

The museum sector has a long history of reinventing itself in the context of new environmental and social trends and challenges through both academic theorizing and experimentation in museum practice. The new museology movement begun in the 1970s was founded on new critical and reflexive approaches to museum philosophy and practice concerning the social roles and purposes of museums in society, the politics of representation in exhibitions and collecting (Vergo 1989). The need to foster pluralist approaches to visitor and community engagement articulated through the notion of the museum as forum (Cameron 1972) was one of the drivers of this movement over the last two decades (Henning 2006; Hooper-Greenhill 1992; Vergo 1989). Coupled with political and economic pressures, many museum sector institutions have since shifted their focus from their collections towards visitors and the concept of institutions as forums.

Calls for relevance, and the reinvention of the museum institution, remain an ongoing quest in a contemporary, turbulent world. Science center leader Emlyn Koster (2006) challenges the sector to take a "greater role in exploring the things that profoundly matter in the world." Museum scholar Bob Janes urges institutions to develop new goals that respond to local and global social concerns as places for civic engagement, as agents for social change (Janes 2009; Janes et al. 2005) and as spaces where the complexities of the social world can be articulated and played out. As a result, in recent years an increasing number of exhibitions on topical subjects of societal significance have emerged on topics from homosexuality, sexual and racial violence and terrorism to drugs and massacres (Cameron and Kelly 2010).

This chapter draws on the research findings of an Australian Research Council Linkage project, "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions."[2] "Hot Science" was an international, interdisciplinary project that interrogated the roles of cultural institutions in climate change as places to provide information, activate and broker discussions and decisions around climate change issues, locally and transnationally. The project aimed to develop new knowledge about what constitutes effective action around climate change, the critical roles that institutions can play, visions for the future of museums and science centers, and innovative programming ideas that could be used as experimental interventions.

In this chapter we put forward nine propositions, distilled from the project research findings and the sector-wide views presented in the project's concluding symposium in Sydney on May 5, 2011. We use these propositions to look critically at the ways in which climate change challenges the established concepts and practices of museums and science centers as places of influence, relevance and certainty in an uncertain world, including, for

example, the way science is produced, represented and communicated. We take account of the temporal framing of institutions in the past and future, alongside older foundations of trust and legitimacy. We also re-evaluate them as pedagogic, hierarchical institutions and places of reform within governance arrangements and suggest the many new roles museums can play in political and decision processes.

We also ask what institutions need to do to become agents of change in these complex arrangements posed by climate change. In other words, how do institutions like museums or science centers adapt their operations rapidly across different scales, and give rise to polycentric responses? How do they form new cross-sector allies, build new relationships with audiences, and extend networks bringing together disparate people, ideas and institutions across social and geographical distances? How can they foster new complex modes of communication, and deal more effectively with dissent and conflict in transnational and cosmopolitan formations? How do they bring the past, present and future together as a focus for concern, and as modality for formulating creative thought and action? We interweave general statements of principle with concrete examples of initiatives that illustrate a range of innovative programs and collaborations that have led to effective action on climate change across the sector. Together these reflections and programming examples challenge institutions to become deeper, braver, more empowering and philosophically useful spaces (Williams 2010) to meet the new challenges that climate change poses.

Nine Principles For Museums and Science Centers As Agents To Promote Understanding and Action on Climate Change

1. CLIMATE CHANGE IS TOO IMPORTANT TO DENY AND TOO COMPLEX TO REDUCE TO A SINGLE ANALYSIS OR PROBLEM

The museum sector, like all bodies concerned to promote better understanding and action on climate change, needs to recognize that it is a vast, complex, heterogeneous set of phenomena. It presents challenges and invites solutions over many scales of time and space, from personal to global, from the Earth's past to humanity's future. It involves many components and aspects, impinging on biological and social life, economics, politics and culture, stretching all disciplines beyond current limits. Those who reject its importance are living in denial, but advocates of a single analysis and solution also fail to recognize the scope of the challenge.

Museums should not aim at one definitive exhibition, to be repeated for the rest of the century. Different analyses of climate change may generate a continuous series of different exhibitions, creative responses to emerging senses of climate change and what can be done. Rather than concentrating

interpretation on the subject of climate and environment change in one specific exhibition, the Liberty Science Center, Jersey City, New Jersey, US continues to weave this issue into different exhibitions where feasible, and where related to the interpretation of the subject (LaBar 2011). First, by seeing climate change and the impacts humans are having on the environment as a pervasive theme that threads through nearly all aspects of science, technology and society, this institution can make relevant connections to content and situations that may be close to the visitor. Second, it allows the pervasiveness of the subject to be seen. So far this Science Center has presented the topic in several exhibitions, from *Skyscraper, Achievement and Impact, Our Hudson Home* and *Breakthroughs* to aspects of food and cooking in *Cooking: The Exhibition*.

Climate change challenges the way in which institutions situate themselves in time, and formulate themselves as places to offer certainty and security. Institutions have tended to focus on the past, with an eye on the future. Lessons from the past are seen as able to provide a script for the future, and in the case of science centers in particular technological innovation provides the necessary vision. Conventional narratives of the future and climate change in museums and science centers are dominated by attempts to control the planet's climate by reducing levels of greenhouse gases in the atmosphere through behavioral change. Others use narratives of fear and catastrophe as a lens. Mike Hulme (2009) views climate change not as a problem to be solved but as a creative opportunity that offers us new resources and new insights to innovate, change and diversify (Cameron 2011). New scenarios in exhibition development, as seen with the exhibition *Science of Survival* from the Science Museum in London and the exhibit *Climate Change, Our Future, Our Choice* at the Australian Museum, engage visitors to imagine different future climate and lifestyle scenarios in 2050, all directly linked to risk forecasting and modeling used in the climate science, finance and insurance sectors.

Museums and science centers can engage a future-oriented, forward thinking frame, as places to link the past to the far future through projections of what might happen as places to offer practical governance options and as places to present long-term temporal trajectories. They offer an antidote to short-term thinking and the failure of governments to act, by presenting the variable dispositions, ideologies and governance options, thereby constructing a mediated view of the future as a series of creative pathways (Cameron 2011).

Shifting the temporal framing of an institution can happen, if taken slowly and linked to institutional branding. Museums and science centers can engage the future through programming by using creativity and imagination as a lever for cultural improvisation. Creativity as a mode for change must work alongside a critical and reflexive analysis of our views and values, thereby demonstrating how all these things are linked to climate change (Cameron 2011).

2. THE MUSEUM SECTOR NEEDS TO DRAW ON ITS HETEROGENEITY TO RESPOND TO THE CHALLENGES OF CLIMATE CHANGE

All museums and science centers have their own histories, traditions, resources and connections, differences as well as links, which are part of what they bring to the task. "Classical" forms co-exist with "new" (second/third/fourth generation), added or grafted on to allow new complex strategies. Museums old(er) and new(er) can be "safe places for unsafe ideas" (Gurian 2005). Museums need to integrate old and new in strategies to excite, engage and inform citizens.

Institutional authority can be reframed, building on and establishing new concepts of trust and legitimacy. Climate change means different things to different people in different locations, based on their ideologies, values and views of the world, of nature, of the economy, their ethical frameworks and perceptions of what is at stake, including consumption, economic growth, sovereignty, species extinction, the poor or distant others, their predicaments and our responsibilities (Hulme 2009). This is the reason why many come to feel they can't agree on what to do, if anything. These dynamics of fragmentation and contradiction alongside a lack of reliable scripts for action have deep implications for museums and established practices. Established ways of engaging climate change based on mitigation are limiting. A single-minded emphasis on scientific statements about levels of greenhouse gas emissions is not enough as a means to persuade people to change their behavior. Thinking of this kind does not treat climate change as a complex system where the diverse ideologies, views and values that people hold about the way to live in the world are tightly coupled with climate change.

A reflexive (deep) critical analysis of these diverse views, values and ideologies about the way we live in the world, and how these views and practices contribute to climate change, is an integral first step in formulating and activating plural governance strategies. Without such an awareness of complexity the situation is paralyzing for museums and science centers because they are conflict adverse (engaging different world views can lead to disagreement) and do not deal well with complexity. Museums and science centers need to acknowledge that climate change as an idea and as a phenomenon is shaped by many different actors and institutions (Cameron 2011).

In a complex approach to climate change, a deep, critical and reflexive analysis of the values, ideological systems and practices that underpin the way we currently live in the world can act as a lever for action and to frame different governance projects according to these world views. This situation requires a reframing of institutional practices from being seen solely as authoritative information sources to also offer expertise that acknowledges plural actors and perspectives, and engages with deeper, more reflexive frames (Cameron 2011). The "Hot Science" research findings confirm the

pivotal role museums and science centers have in communicating up-to-date science to inform personal positions and actions (HSGC Focus Group Transcript AM#2). Respondents, however, felt museums and science centers should be doing more.[3] For many respondents museums and science centers are viewed as sites for presenting opposing scientific positions on the climate crisis, where institutions were seen as having a role in representing all views. In instances where uncertainty or conflicts arose between different expert opinion and future predictions, the contextualization of those positions was important: "you've got to take both sides into consideration . . . you can't unequivocally say one's right and one's wrong, you've got to lend different weights to different theories" (HSGC Focus Group Transcript AM#3). Because debates move quickly and are often conflicting, audiences cited judgments about the relative credibility of sources as amounting to new institutional forms of quality assurance. This is in contrast to more traditional, authoritative, objective content with a strong disciplinary tone (Cameron 2011; 2012). Here audiences conceive institutions' potential in media and communication networks as part of systems of extended peer review and express a new formulation of institutional trust and credibility in the "to be informed mode" as peer reviewers.

Systems of peer review in the museum context contribute to the research assessment process through a two tiered procedure. The first procedure involves the presentation of climate change as a complex, social, cultural scientific and economic issue. The second procedure is the contextualization of the research informing these debates. This involves reviewing the evidence and the credibility of the debates/research in regards their history; how knowledge underpinning the debate is produced; and weighting the various debates and sources in regards their levels of acceptance and what is at stake for each of the actors (Cameron 2011).

Science knowledge production can also be subject to a reflective process. Such a process can illustrate how science and scientific practices have changed; the types of science and science production processes that are used to form views; how these are linked to the emergence of different world views and differing governing strategies; how scientists weight evidence and deliberate; practices of expert deliberation around climate change and deep uncertainty, and how scientific knowledge gets used in society (Cameron 2011; Hulme 2009). Science therefore becomes just one of the many kinds of knowledge informing climate change action and public policy debate, and knowledge that will always be partial, conditional and uncertain (Hulme 2009).

On the other hand the "Hot Science" qualitative research findings shows that people understood climate change as a complex and a highly controversial battleground of different ideologies and philosophies of life, each having a profound influence on attitudes toward climate change and courses of action (HSGC Focus Group Transcript AM#2). For these reasons participants expressed a desire to hear about differing views, practices and

courses of action. They wanted to know about the competing interests and agendas that cross cultural divides, sectors, scales, and disciplines, and for institutions to weigh these views and values as part of peer review process (HSGC Focus Group Transcript AM#2). Many felt that these views must be presented in a way that leaves space for visitors to come "to their own decisions" (HSGC Focus Group Transcript MV#3) thereby enabling them to formulate their own values, moral position and emotional responses to the topic. Impartiality and balance is reworked within this deliberative frame as a range of views to be expressed (Cameron 2011). Yet, it was also seen as important that the museum express its own position on any contesting representations.

3. CLIMATE CHANGE IS MULTI-SCALAR IN SPACE AND TIME, AND NEEDS A MULTI-SCALAR RESPONSE

Climate change and responses to it are aspects of a linked phenomenon, yet local sites and personal spheres of action have their own features. Geological time is hard to see or represent as an experience. The future does not yet exist, and is even harder to represent or experience. To be moved to act on climate change, citizens and scientists alike must "see" across all these scales, be able to put past, present and future together and connect personal circumstances and neighborhoods, the fate of their country and the planet. For instance a strict definition of "climate" as an abstract scientific entity to be contrasted with and emphasized over "weather," can create problems of understanding and engagement for many citizens, who feel they understand weather but not "climate." If museum visitors respond to "weather" but not "climate," then "weather" in all its changes over many scales of time and space, including extreme events, can be used to make climate change threats and responses more vivid and comprehensible. Museums operate in many different spaces, which can act in systematic ways on and in multi-scalar space.

4. CLIMATE CHANGE RESPONSES SHOULD BE POLYCENTRIC, USING NETWORKS

Faced with the complex, dynamic challenges of climate change as an interlocking set of environmental, social and political forces, museums and other agents of change need to be able to adapt rapidly across different scales and to identify new allies and resources to cope with new or old problems. Networks allow relations across vast social and physical distances that need to be recognized and incorporated into cohesive responses.

One example of science center interventions in awareness raising and transnational network building is the transnational program *International*

Action on Global Warming (IGLO). This initiative was launched on March 1, 2007, to coincide with the start of the International Polar Year. It is a project of the Association of Science-Technology Centers (ASTC) "designed to raise worldwide public awareness about global warming." IGLO's focus was on the Polar Regions and their influence on "the Earth's climate, environments, ecosystems, and human society." It aimed to educate "world citizens" on these issues and coordinates its activities through an extensive website. This site operates as a forum and as a repository for materials concerning the communication of climate science. It includes a "toolkit" for developing programs to which members have contributed and collaborated.[4] IGLO has realized several ambitious projects. Two of these are particularly noteworthy.

The Albedo Experiment brought public attention to the role that polar surfaces play in maintaining planetary temperatures.[5] Established in May 2008 as a collaboration across twenty-one countries, between nineteen science centers and numerous schools, the Experiment engaged 1,870 people in the manufacture of large, white surfaces. These "mock polar ice caps" sought to highlight the Albedo effect: the effect produced by the reflection of solar radiation off the Earth's surface. Here the whiteness of the polar caps is significant in deflecting heat, thus cooling the planet. NASA satellites produced striking images of the simulated ice caps.

Another initiative in the IGLO suite of programs is DECIDE. This is a table game to be played in small groups.[6] It aims to facilitate discussion and insight into science and technology issues facing communities. DECIDE was initiated by the European Science Centre and Museum Network (ECSITE) in response to surveys and media reports that suggested people were concerned about the latest scientific and technological developments and wished to have greater input into science and technology policy. For ECSITE the game presented an occasion for science centers' to act as fora for discussions on complex ethical issues accompanying these developments. When DECIDE was first launched in January 2006 there were six versions covering, respectively, xenotransplantation, nanotechnology, stem cells, genetic testing, neuroscience/brain enhancement and HIV/AIDS. Each provided an opportunity for participants to inform themselves on one of these subjects, to discuss issues arising, and, finally, to negotiate a shared policy option with fellow players. The resulting decision was then uploaded to the DECIDE website, where outcomes of each game were aggregated on a country-by-country basis for comparison.

In collaboration with the ASTC/IGLO the game's subjects were expanded to include climate change.[7] This edition of the game was rolled out in a number of regional and language versions and served as the central piece to a major IGLO event: Conversation on Climate Action, October 4, 2007. Overwhelming numbers of respondents in the US dialogues cited the need for stricter energy regulations and attitudinal and behavioral changes to consumption.[8] In Italian science centers and schools the

policy deemed most compelling was investment in renewable technologies followed by education (Amodio 2008). The Indian dialogues similarly identified the most important policy initiative to be education around climate change matters from which citizens can make informed decisions, followed by renewable energy and planting trees and protecting ecosystems.[9]

While museums are already networked organizations as demonstrated through these initiatives, this capability will grow more diverse and extensive, able to include many who are currently excluded. Institutions must act as part of large and small centers and as part of collectives around plural governing projects. Margit Fischer, First Lady of Austria, made a case for a science center and museum partnership with the United Nations at the Planet Under Pressure (PuP) conference in London on March 29, 2012.[10] Science centers and museums are ready to drive public engagement in the Rio+20 process, Fischer says, and she makes a case for a strategic plan to channel the energy of science centers and museums into a UN public outreach strategy.

Relations between climate change, science, culture and social practices need to be reframed. Current approaches to representing the science of climate change in museums and science centers are based on a separation of the science from its social and cultural dimensions. Climate change must be embedded in all programs (LaBar 2011). Climate change as a phenomenon is now part of the ecology of life, and it must be embraced as a fundamental element of living in the contemporary world (Cameron 2011).

The relationships between nature, science, culture, social practices and worldviews need to be reformulated, acknowledging the complex relations and entanglements between all these elements and focusing on how climates and societies interact (Cameron 2011). In the In Our Connected Earth interactive game as part of the *Atmosphere* exhibition at the Science Museum, London, developers sought to present climate change as an ecosystem incorporating human and nonhuman elementspeople, land, ice and oceans, for exampleas entangled with each other. This example is the first step in articulating the hybrid and relational nature of human and nonhuman forces in climate change.

Museums can be seen as media within larger communicative ecologies. Museums engage in the communication of climate change as producers of experiences (not just as displayers of objects) and therefore their role has to be considered within a broader structure of communication and information. Each instance of communication or information takes place within an already existing communicative ecology, where new media articulate and integrate with "older" media. Social media are a means to an end, to engage people in climate change issues rather than an end themselves (Salazar 2011). An interesting museum exhibition worth mentioning is *Mission Gaia,* an interactive immersion game designed and produced by TRAM MÉDIA in Canada as part of a large multimedia installation that focuses

on issues of sustainability and development. The game is based on offering players an experience of a dystopic future affected by uncontrolled consumption, social injustice and ecological degradation with the aim of making visitors aware of the urgent need for action.

However, dystopic visions of the future must be balanced with optimistic perspectives in which action is seen as plausible and possible. One-off museums exhibitions are in many ways like one-off campaigns. They come and go and focus on a target output. What is required from the museum sector is a consideration of how to be part of developing long-term processes of social change. In this regard, museums and science centers must consider the opportunities of connecting with existing local networks, where the museum or science center becomes part of a larger ecology (social and technological) of communication. Programming options should take into account these challenges and prospects. An overview of programming in museums and science centers shows that effective communication of climate change that inspires action, is the result of an engagement with publics inside and outside the museum/center, across a wide range of practices: exhibitions, hands-on exhibits and science demonstrations, educational labs and pedagogical materials, workshops with school groups, lectures and debates involving scientists and the general public, forums and citizens' conferences, film and video festivals, digital storytelling workshops, digital games, and using social media tools and P2P networks (Salazar 2011). In other words, the agencies of museums and science centers in climate change deliberations is strengthened when these institutions are open to connect with broader communication ecologies and civil society initiatives.

A relevant example is the *ACCENT Project,* a year-long initiative that took the form of a European participatory campaign—called *I Do,*[11] where fifteen museums and science centers exchanged their experiences under a common framework to address the complexities of public communication of climate change. The premise of the project is not dissimilar to that faced by most institutions engaging with climate change communication. That is, how can institutions create and develop interactive and participatory communication tools amidst huge amounts of scientific data and the interplay of differing interests and knowledge practices, in order to engage with a wider number of publics "based on dialogue and public involvement rather than on 'pure' information" (Amodio 2011). These new methods included hand-on exhibitions, participative games, local citizen's forums and other formats, which were used by science centers and museums to find ways for publics to be effectively engaged in climate change issues.

A significant challenge that emerges from these experiences is how to engage the public while inside the institution's space, but also outside its walls where dialogue may be established among scientists, stakeholders and the public (Amodio 2011). *ACCENT Project* activities involved the

partnership of over thirty-four national and international network organizations in which local citizens' debates played a pivotal role. Three relevant outcomes of these debates were that citizens became aware of the need to change lifestyles, production and consumption patterns; the need to value the interconnections between the local dimension of behaviors/choices and global consequences; and the need to promote education through alliances between schools, the world of research, NGOs and science centers (Amodio 2011). In terms of evidence of impact of initiatives like these, it is worth considering the number of visitors to the science centers and museums involved in the project, which including teachers, students and the general public accounted for 2.6 million people across the fifteen countries. These visitors were able to experience rich exhibitions on climate topics as well as citizens' debates and expert seminaries. The project leaders estimate that of these number of visitors, about 200,000 people were directly and actively involved in activities such as science demonstrations debates and participatory activities.

5. CLIMATE CHANGE RESPONSES NEED POROUS BOUNDARIES, "LIQUID" ORGANIZATIONS AND "CLUMSY" SOLUTIONS

For museums to be more effective communicators of climate change issues, conceptual walls and barriers, as well as physical walls and barriers, they need to allow and negotiate flows and exchanges in dynamic systems. Solutions need to be provisional, right for problems as they present themselves. Distinctions between inside and outside museums, visitors and other citizens, local and overseas, younger and older, more or less well-educated, different cultures and backgrounds, need to be better recognized and managed. Most boundaries that museums recognize will still exist in some form, but all can be negotiated to better serve the role of museums as agents of change. In order to respond like this, museums and the sector will need to rethink many assumptions and forms of organization.

Liquid museums are conceptual and strategic simplifications to help museums act more meaningfully in a fluid, turbulent and complex world. Using concepts of assemblage and liquidity, institutions can be thought of as made up of material components (buildings, people, computers, exhibitions, collections, geographical location, funding etc.) and expressive forms (practices and capacities such as institutional mission statements; expressions of legitimacy; expertise; trust; authority; networks; dispositions; aspirations; contracts; brand etc.). Liquid museums operate as, and in, dynamic, gathering or assembling, and disassembling processes that transcend national boundaries. The concept of the "liquid museum" is a useful tool to consider institutions and their capacities as agents in the contemporary world as embedded entities within complex climate change

governance arrangements. Processes and events are relationally interdependent, and institutions act as part of and within open-ended collectives (Cameron 2011).

Museums have new opportunities to operate in between communities and formal politics as deliberative spaces, and in processes of collective intelligence, thereby opening up new spheres of influence and relevance. Museums and science centers have the potential to be more influential in the political field, and in collective action, helping to formulate and influence different types of interventions. Just taking political decisions on policy is no longer enough. Rather for policies to be made effective and viable the formal political process must develop fora to strategize with citizens.[12] Citizens have different expectations, capacities and skills than before, due partly to the rise of the internet and social media.[13] They are also less trusting of governments, better at governing themselves and less amendable to be governed.[14] By operating in new ways in governing climate change, such institutions act as deliberative spaces—reviewing various generic policy options, and bringing diverse stakeholders together in processes of collective intelligence. One of the valued assets of institutions is their ability to promote longer-term thinking, beyond the short termism of government and the profit-driven interests of the private sector (Cameron and Deslandes 2011).

Museums can help to forge connections in debates on generic policy options (as opposed to specific policy proposals that might be seen as too political) by critically reviewing the debates and options against the research, and by examining their implications for various social futures scenarios through systems of peers, open review and quality assurance processes. They can act as congregational spaces, bringing cross-sectorial stakeholder groups and audiences together with the research, and by facilitating and brokering deliberations around the various options and testing these against various disciplinary, lay expertise and local knowledge. They can facilitate inputs into potential policy positions as a mechanism for detailing future scenarios, and ways to live in the world differently under the conditions of climate change (Cameron and Deslandes 2011). Museums and science centers can feed the ideas that emerge from these deliberations into other governing agencies as a precursor for action, and as plural governance projects (Cameron and Deslandes 2011).

One such program was the global initiative *World Wide Views on Global Warming* (WWViews) held September 26, 2009 in the lead up to United Nations Climate Change Conference (COP15) in Copenhagen. Many museums and science centers and their communities participated in this global forum. This action gave citizens all over the world an opportunity to define and communicate their positions on issues central to the negotiations at the United Nations Climate Change Conference (COP15) in an effort to influence the COP15 negotiations. While the COP15 negotiations failed to meet the expectations of many in formulating a global agreement on emissions

reduction, WWViews sent vital messages about climate policy from citizens to decision makers and it set a trailblazing precedent by demonstrating that citizens' opinions have merit and their views should be included in global political processes.

Evidence suggests that there are major gaps in the knowledge and communication of climate change (between global/local, expert/lay sectors). Dominant climate change narratives are usually presented as emphasizing the power of global climate systems (and the voice of scientists) over threatened, at-risk and vulnerable local communities (with little or no voice of their own). International research suggests there is more information at a global level, but much weaker information at a local level. Failure to understand the causes and consequences of climate change makes it hard for people to connect the phenomenon to their own lives. Responses to climate change are better understood in relation to emerging notions of citizenship than to climate change crisis narratives. Learning how to cope/deal/adapt/act on climate change in specific local contexts may not be transferable to other local contexts.

The public understanding of science frameworks used in many museums and science centers often works to displace lay, indigenous, or other knowledge systems and may weaken civic action. The notion of "cognitive justice"—the dialogue between the different knowledges and perspectives, and the right for different forms of knowledge to coexist without being marginalized by official, state-sponsored forms of knowledge—may help create and develop processes of public engagement and climate justice (Salazar 2011). For museums and science centers there are challenges and opportunities in acknowledging and actively promoting indigenous peoples' knowledge and local community adaptation strategies; whether these be in order to contribute to building awareness of valuable traditional adaptation and mitigation practices or for creating interfaces through which synergies between expert and lay knowledges may be recognized and implemented into real-world solutions. In this regard, engaging with local communities is significant because it is primarily within local contexts where adaptation, mitigation and action on climate change actually take place (Salazar 2011).

6. ENGAGING CITIZENS' NEEDS, "THICK" COMMUNICATION, INTERACTION, DIALOGUE, TRIALOGUE—NOT MONOLOGUES FROM THE POWERFUL [AuQ22]

The unquestioned authority that both science and museums once relied on can be counter-productive if the task is to empower new generations. Such authority can alienate, rather than generate trust. New media alongside old can enrich the range of means of communication, but only if the form and

intent of the communication is democratic and respectful. Dialogic models lead to mutual change over time. Trialogic models expand the awareness of social complexity at every level. Scientists can be consciously aware of, and learn about, museum perspectives and the needs of publics; and publics can be given insights into the distinct perspectives of science and museums (Hodge 2011).

Exhibitions can have a clear focus but not a single message. Planning, designing and changing exhibitions and displays should be informed by many voices organized as trialogues. Kinds of media, collections, written texts and electronic media should interact with each other. On-site, off-site and online sites should be in a trialogic relationship (Hodge 2011, 2011a).

Museums and science centers across the world are coming to terms with the idea that climate change should be presented as a story based on experiences worth listening to, not just as disembodied information without a storyteller. Ways of knowing about climate change can't be disembodied as abstract information (as is often presented by the mainstream media), but must be rich in feeling, in intuition and connected to larger social, historical and ecological contexts. For this reason, community engagement is essential for museums. A politics of engagement must also include a serious concern for climate change education and literacy, a public pedagogy of climate change, which often does not take place through other cultural institutions (Salazar 2011).

For museums and science centers there are challenges and opportunities in engaging with civic-driven initiatives for social change and climate justice. This entails looking beyond the broadcasting model of communication into community, alternative and citizens' media models and connecting/relating to social movements on the ground. Together with a better understanding of how citizen media practices offer alternative and participatory models of civic-driven change, the museum sector may benefit from connecting more efficiently with climate action groups, as climate change actions are no longer confined to activism in the public policy domain. There is a new focus on facilitating learning and change in household and consumer domains, and museums are well positioned as connectors and catalyzers (Salazar 2011). Once again we could mention the *ACCENT Project,* which assessed the outcomes of twenty-five local citizens' debates in order to deliver reliable data on the European citizens' opinion on climate change issues and their perception of them. In these citizens debates, more than 670 people were invited to discuss matters of concern with more than 150 experts, and with decision makers and other relevant stakeholders. Some of the outcomes of these citizens' debates are indicating that publics are aware of the need to change lifestyles and consumption patterns and are of the opinion that the local dimension of behaviors/choices has global consequences. There is a high level of awareness of the need to promote education through alliances between schools, science research, NGOs and science centers and museums (Amodio 2011).

7. A DIRTY WAR HAS BEEN DECLARED, BUT IT SHOULD BE RESISTED, NOT FOUGHT

Vested interests with access to huge political, organizational and media resources have reframed the debate about climate change in ways that disturb scientists and museum staff who believe in the power of reason and respect for truth (Hodge 2011a). Spokespeople are threatened, specious arguments are presented as truths and a lack of logic is proclaimed as superior reason. Yet adopting the same standards or ignoring skeptics is counterproductive. It fails to engage with substantive issues.

Incorporating these voices into the space of museum is a risk that needs to be taken. Good scientists are true skeptics. This complex point must be made in publicity materials and in programs. Museums and science centers can act in media-scapes by providing different perspectives than the media, opening up debates to include other points of view beyond mainstream positions. These institutions can operate as moderators, intermediaries and commentators, providing reports, analyses and comments. New forms of quality assurance, trust and legitimacy can be framed around an institution's agency, including systems of peer review, and as expert reviewers, along with others in complex debates (Cameron 2011). Balance is reworked within this deliberative frame, as a range of views to be expressed and examined (Cameron 2011).

Social media and alternative reality gaming network technologies can be used to assemble the ideological positions and interests of stakeholders and audiences, and activate systems of peer review in conjunction with systems of public review. In combination with discussions with publics, this range of perspectives can be fed into the review, weighting and quality assurance processes. By looking at climate change as a complex issue that involves many different values and worldviews, museums and science centers can open up a space to consider climate change as a contemporary social and cultural condition from which diverse governmental positions and options might emerge (Cameron 2011).

8. GIVE ART A GO

In tapping deep movements of cultural sentiment, art can be ten years ahead of the curve, engaging with new media as well as old. Its oblique communication gets highly complex messages across. Feelings, emotions and affects play a complex role in the dynamics of human action, in science and museums as in other spheres. They can be mobilized through art and other strategies to connect with imagination and creativity. As McKibben (2010) says, "you don't build movements with bar graphs. You build them, in part, with art. With painting and with music and with graffiti and with dance and with concerts and with everything that engages the right brain.

Or that engages the heart, trusting that where the heart leads the head will follow."

There are several other initiatives worth mentioning, where artists and cultural institutions have partnered. A relevant art–science collaboration is *Creative Climate*, a ten-year project (2010–2020) launched by the BBC world service in December 2009 with the Open University. This web-based project features diary entries where individuals can record their impressions in order to chart personal experiences with environmental change over a decade. Visualizing future scenarios of climate change on the planet is certainly one area of particular interest where artists and institutions also collaborate. One interesting initiative worth mentioning is Metis Media's *3rd Ring Out*,[15] a multimedia and multidimensional scenario-building project developed by Zoë Svendsen in the UK in 2010–2011. Involving public performance and installation, audiences were asked ethical questions "splicing recognizable images of the UK with projections of possibility" and invited to vote to decide "how to respond to a developing scenario of climate-changed future."[16]

Well-informed publics are a first step to acknowledging that we are living through a tipping point phase in our existence in this planet. However, as we have mentioned before in this chapter, museums need to rely less on presenting audiences with information and more on creating and designing richer experiences. The emotions they aim at should have range and balance, encompassing joy, wonder and delight, rather than just pressing the buttons of fear and guilt. There is a huge potential for museums and science centers to partner with local and global climate change arts initiatives. One such example can be seen in the activities of 350.org, a not-for-profit organization of volunteers working across 188 countries that aims to develop a global grassroots movement on climate change action through online campaigns, grassroots organizing and mass public actions. Using online tools to facilitate strategic offline action, 350.org aims to become a global laboratory for best practices in strengthening a global climate movement and catalyze transformation around the world. Some of their actions to date include 5,200 simultaneous rallies and demonstrations in over 180 countries during October 2009. In 2010, 350.org launched EARTH,[17] the world's first global satellite art project. In more than sixteen places around the world, the public collaborated with artists to create art so large it could be photographed from space. The art pieces highlighted a local climate change issue or solution. In September 2011 they also organized "Moving Planet," a massive day of action to move beyond fossil fuels.

9. BUILD NEW RELATIONS TO NEW PUBLICS

Climate change is everybody's business. The science and museum sector need to address the exclusions that have been part of their history and identity, which still continues in spite of the efforts of many. This is a task for

new media, including the social media, plus concerted efforts to go beyond the walls of museums. It requires a broader idea of citizenship, including marginalized citizens and indigenous people in Australia and elsewhere. The current museum sector is better positioned to respond to this challenge than it has ever been, but there is still much to do.

It is necessary to think about audiences differently, as valued actors. Traditional relations between museums and audiences are based on disciplining them—telling them to change their behavior and become good ecological citizens. New relations must be formulated with audiences that are more respectful of their own skills, capacities and opinions. Co-creation and co-discovery become key themes (Cameron 2011).

The role of museums and science centers is not to prove the science of climate change, but to improve the communication of climate change. For museums and science centers there are challenges and opportunities in moving beyond the notion of informing visitors and audiences (a vertical dissemination of data and messages) to engaging with publics (a horizontal process of dialogue and participation), where communication entails developing processes for strengthening participation mechanisms, not just enhancing organization visibility. Museums must not only inform citizens, but also equip them with tactical knowledges to enable participation in actions and debates on climate change (Salazar 2011).

In a complex climate changing world, and in the context of social media, audiences become subjects for action having capacities, desires, expectations, talents, expertise, reflective, reflexive and creative capabilities with variable powers to act, within a mobile, open, interacting museum system (Cameron 2011).

Relevant innovations in this field include, for example, the conceptualization and prototyping of "public interactives" (Balsamo 2011) in museum contexts. These are devices that are designed to engage people in conversations with digital media for the purposes of information exchange, education, entertainment, and cultural memory and therefore can serve as interactive experiences in museums—and other public outdoor settings—as ways to enact novel forms of public communication (Balsamo 2011). These tools become relevant within networked, distributed learning environments created through the connections among different nodes, where museums and science centers can be connected to homes, schools and other public institutions. Thinking about the "distributed museum" (Balsamo 2011) as an institution distributed across multiple media platforms and physical space, museums and science centers can really capitalize on the opportunities of becoming relevant nodes within a larger techno-cultural assemblage of physical and virtual spaces that open up opportunities for social interactions and for developing information resources and communication platforms (Balsamo 2011).

Evidence indicates that lack of public understanding is a major obstacle, inhibiting action on climate change. Informing audiences about the science

of climate change is a different matter to communicating with citizens on climate change issues. Most media only inform, they don't communicate. Information refers to a one-way diffusion of messages whereas communication is a dialogic and trialogic process of creating meaning and sharing values. In many countries, the mass media is the main source of information about climate change. Focusing on disseminating recycled scientific information, most news-media frame climate change in ways in which preferred discourses and dominant narratives are imposed. While the degree of certainty about many aspects of climate change among scientists is high, the media portray a context of uncertainty and skepticism about the real incidence of human induced climate change, or highlight the political and economic costs of deep policy reform. Raising awareness of the existence of climate change will have little effect if there is no creation of processes for social and behavioral change (Salazar 2011).

CONCLUSIONS: REAL CHANGE, DEEP AND SUSTAINABLE, IS STILL THE AGENDA

Recognizing the complexity and multi-scalar nature of climate change is not giving up on climate change action, but instead offers a way to build more effective responses that are understood and endorsed by many more people and groups. This includes, for example, the modes through which museums and science centers have a responsibility to engage with other knowledges of climate change, such as indigenous knowledges. Achieving real change needs real pressure, exerted on those with effective power. The status and authority of science and scientific institutions, as of the museum sector, have influence, but so far this has not translated into trans-national policy action. Science is important, but not "scientism." Scientism is exclusive reliance on the authority of science, through the production of science statements cleansed of their controversial or uncertain elements and offered merely as a lever to tell people to reduce their own personal carbon footprint. Similarly "economism" and "technologism," the exclusive reliance on economic or technological fixes and technology as saviors, are deficient. The museum sector is not autonomous—it has to heed the views of funding bodies. Governments listen, but only to matters within a limited range. Big business exercises power through many means, including ownership and influence of media, lobbying and misinformation. Sustained change in attitudes, behaviors and policies around climate change requires museums and others to build coalitions and diversify forms of action, to challenge and change deep and persistent frames and to shift the tectonic plates of public opinion. It is not about winning a particular debate or mounting one successful exhibition. Adequate and sustainable responses to climate change require that we think how we can effect substantial changes in the system of production. This is the implication drawn from many scientists who have put into

question the continuance of a fossil-fueled global society. Every consumer, every product, every species, every forest, is concerned in this, together with every river, every glacier and ocean current.

But museums would be profoundly mistaken if they took this vision and diagnosis as one that was shared by everyone, including scientists. If they assumed that this version of reality prevailed everywhere, they would have nothing to say to those that do not hold that assumption. They would have nothing to say to those that remain committed to other versions of reality. Rather, the museum's task is to contribute to the slow and different work of building a common world, of composing a world that we all, humans and nonhumans, come to share. For the museum, a common world cannot be its beginning—it must be its horizon. For this is what has to be composed if human living is to accommodate a soon-to-be nine billion people within a habitable planet earth (Dibley 2011).

NOTES

1. This chapter is a re-publication of Cameron, Fiona R., Bob Hodge, and Juan Francisco Salazar. 2013. "Representing climate Change in Museum Spaces and Places." *Wiley Interdisciplinary Reviews: Climate Change* 4(1): 9–21.
2. The project "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions" was led by Chief Investigator Fiona Cameron with Chief Investigators Bob Hodge, Brett Neilson and Juan Francisco Salazar from the Institute for Culture and Society; Jann Conroy from the Centre for Plant and Food Science and David Karoly from Earth Sciences, University of Melbourne with PhD candidate Scott East. Research support staff included Ben Dibley, Carol Farbotko, Teresa Swirski, Ann Deslandes, Anne Newstead and Rebecca Giggs. Institutional and representative partner investigators include: Museum Victoria and audience advocate Carolyn Meehan; Australian Museum with Lynda Kelly, Manager of Web and Audience Research; the Powerhouse Museum with Sebastian Chan, Head of Digital, Questacon (the National Science Centre, Canberra); Graham Durant, director of Liberty Science Center, Jersey City, New Jersey, USA; Wayne LaBar, Vice President of Exhibitions; and Richard Sandell, Head of School of Museum Studies, University of Leicester, UK.
3. Places to communicate the up-to-date science. This agency was seen as one of the largest gap roles for Australian and US museums with 51% and 50% respectively, agreeing that institutions currently communicate the up-to-date science, while 76% and 74% respectively, believed museums should be taking on this role.
4. http://astc.org/iglo/
5. http://atmospheres.gsfc.nasa.gov/iglo/view_cat.php?cid=24. See also Lynn Lim, "The Albedo Experiment: They Came, They Saw, They Reflected," *Dimensions,* September/October, 2008.
6. www.playdecide.org/index.html
7. http://atmospheres.gsfc.nasa.gov/iglo/view_cat.php?cid=13
8. http://astc.org/iglo/category/iglo-events/ for details on the US IGLO dialogues around policy.
9. Ibid.

10. "Science Centres and Museums Call for UN Partnership to Bolster Public Engagement for Sustainability," *Escite.com*. www.ecsite.eu/news_and_events/news/call-un-partnership-science-centres-and-museums
11. www.i-do-climate.eu
12. "Why Deliberative Democracy Matters: A Sydney Ideas Arts Matters Forum," (2011) http://sydney.edu.au/sydney_ideas/lectures/2011/why_deliberative_democracy_matters.shtml
13. Ibid.
14. Ibid.
15. 3rd Ring Out, www.3rdringout.com/scenario/
16. Ibid.
17. 350 Art, http://earth.350.org/

REFERENCES

Amodio, Luigi F. 2008. "Global Warming from Science to Action: The Italian Case." Paper presented at the 5th World Science Centre Congress, June 15–20, 2008, Toronto.

Amodio, Luigi F. 2011. "Informing and Engaging Citizens on Climate Change Issues." Paper presented at the 6th World Science Centre Congress, September 4–8, 2011, Cape Town. http://6scwc.org/pdf/6SCWC%20Programme.pdf

Balsamo, Anne. 2011. *Designing Culture: The Technological Imagination at Work*. Durham, NC: Duke University Press.

Cameron, Duncan. 1972. "The Museum, A Temple or a Forum." *Curator* 14(1): 11–24.

Cameron, Fiona R. 2007. "Moral Lessons and Reforming Agendas: History Museums, Science Museums, Contentious Topics and Contemporary Societies." In *Museum Revolutions,* edited by Simon Knell, Suzanne Macleod and Shelia Watson, 330–342. London: Routledge.

Cameron, Fiona. R. 2011. "From Mitigation to Complex Reflexivity and Creative Imaginaries: Museums and Science Centres in Climate Governance." *Museum and Society Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions* 9(2). www2.le.ac.uk/departments/museumstudies/museumsociety/volumes/volume-9-2011

Cameron, Fiona R. 2012. "Climate Change, Agencies and the Museum and Science Centre Sector." *Museum Management and Curatorship* 27(4): 317–339.

Cameron, Fiona R. and Anne Deslandes. 2011. "Museums and Science Centres as Sites for Deliberative Democracy on Climate Change." *Museum and Society Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions* 9(2): www2.le.ac.uk/departments/museumstudies/museumsociety/volumes/volume-9-2011

Cameron, Fiona R. and Lynda Kelly, eds. 2010. *Hot Topics, Public Culture, Museums*. Newcastle on Tyne, UK: Cambridge Scholars.

Cameron, F. R, B. Dibley, C. Farbotko, C. Meehan, L. Kelly. 2009. Findings of the Hot Science, Global Citizens Online survey. Centre for Cultural Research, University of Western Sydney, unpublished manuscript.

Dibley, Ben. 2011. "Museums and a Common World: Climate Change, Cosmopolitics, Museum Practice." *Museum and Society Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions* 9(2): www2.le.ac.uk/departments/museumstudies/museumsociety/volumes/volume-9-2011

Gurian, Elaine. 2005. "A Blurring of the Boundaries." *Curator* 38(1): 31–37.

Henning, Michelle. 2006. *Museums, Media and Cultural Theory.* London: Open University Press.

Hodge, Bob. 2011. "Beyond Confrontation: The Trialogue Strategy for Mediating Climate Change." Presentation at *Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions,* May 5–6, 2011, Sydney. www.hotscienceglobalcitizens.net/index.php/symposium

Hodge, Bob. 2011a. "Museums and Attacks from Cyberspace: Non-linear Communication in a Postmodern World." *Museum and Society Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions* 9(2): www2.le.ac.uk/departments/museumstudies/museumsociety/volumes/volume-9-2011

Hopper-Greenhill, Elaine. 1992. *Museums and the Shaping of Knowledge.* London: Routledge.

HSGC Focus Group Transcript AM#2, Centre for Cultural Research, University of Western Sydney, unpublished manuscript.

HSGC Focus Group Transcript AM#3, Centre for Cultural Research, University of Western Sydney, unpublished manuscript.

HSGC Focus Group Transcript MV#3, Centre for Cultural Research, University of Western Sydney, unpublished manuscript. [AuQ23]

Hulme, Mike. 2009. *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity.* Cambridge: Cambridge University Press.

Janes, Robert. 2009. *Museums in a Troubled World: Renewal, Irrelevance or Collapse?* London: Routledge.

Janes, Robert and Gerald Conaty, eds. 2005. *Looking Reality in the Eye: Museums and Social Responsibility.* Calgary: University of Calgary Press.

Kelly, Lynda. 2006. "Museums as Sources of Information and Learning: The Decision Making Process." *Open Museum Journal* 8: http://hosting.collectionsaustralia.net/omj/vol8/index.html

Koster, Emlyn. 2006. "The Relevant Museum: A Reflection on Sustainability." In *Reinventing the Museum: The Evolving Conversation on the Paradigm Shift,* edited by Gail Anderson, 202–211. Walnut Creek, CA:AltaMira.

LaBar, Wayne. 2011. "Embedding Climate Change." Paper presented at *Hot Science, Global Citizens Symposium,* Sydney May 5–6, 2011.

McKibben, Bill. 2010. "Want to Light up a Movement? Think Art, Engage the Heart." *The Huffington Post,* July 5. www.huffingtonpost.com/bill-mckibben/want-to-light-up-a-movement_b_635532.html

Russo, Angelina, Jerry Watkins, Lynda Kelly and Seb Chan. 2006. "How Will Social Media Affect Museum Communication?" Paper presented at *Nodem 06—Digital Interpretation in Cultural Heritage, Art and Science.* Oslo, Sweden, December.

Salazar, Juan. F. 2011. "The Mediations of Climate Change: Museums as Citizens' Media." *Museum and Society Special Issue: Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions* 9(2): www2.le.ac.uk/departments/museumstudies/museumsociety/volumes/volume-9-2011

Sandell, Richard. 2007. *Museums, Prejudice and the Reframing of Difference.* London: Routledge.

Vergo Peter. 1989. *The New Museology (Critical views).* London: Reaktion Books.

Williams, Caleb. 2010. "The Transformation of the Museum into a Zone of Hot Topicality and Taboo Representation: The Endorsement/Interrogation Response Syndrome." In *Hot Topics, Public Culture, Museums,* edited by Fiona R. Cameron and Lynda Kelly, 18–34. Newcastle on Tyne, UK: Cambridge Scholars.

Witcomb, Andrea. 2010. "The Politics and Poetics of Contemporary Exhibition-making: Towards an Ethical Engagement with the Past." In *Hot Topics, Public Culture, Museums,* edited by Fiona R. Cameron and Lynda Kelly, 245–264. Newcastle on Tyne, UK: Cambridge Scholars. [AuQ24]

Contributors

Dr. Fiona R. Cameron is a senior research fellow at the Institute for Culture and Society, University of Western Sydney, Australia. Fiona has researched and published widely on museums and their agency in contemporary societies around "hot" topics of societal importance ranging from the agencies of the museum in climate change interventions to material culture, collections, documentation and complexity. Fiona was the lead Chief Investigator on the Australian Research Council Linkage project, "Hot Science, Global Citizens: The Agency of the Museum Sector in Climate Change Interventions."

Recent books include two co-edited collections, *Theorizing Digital Cultural Heritage: A Critical Discourse* (MIT Press 2007), *Hot Topics, Public Culture, Museums* (Cambridge Scholars 2010 with Dr. Lynda Kelly); and a co-authored monograph, *Compositions, Materialities, Dynamics: Theorizing Digital Cultural Heritage for a Complex, Entangled World* (MIT Press, forthcoming with Professor Sarah Kenderdine). Fiona has published widely in *Continuum; Journal of Material Culture; International Journal of Heritage Studies; Museum and Society* and *Museum Management and Curatorship*.

Cecelia Cmielewski is undertaking her PhD at the Institute of Society and Culture at the University of Western Sydney. She held senior policy roles at the Australia Council for the Arts, between 1998 and 2011 and managed SymbioticA at UWA from 2011 to early 2014. In 2012 she curated *Adaptation,* the arts and ecology project with SymbioticA and Mandurah Council, produced *semipermeable(+) f*or ISEA2013 and is curating *meta_narratives* for ISEA2014.

Mauricio Corbalan was born at the city of La Plata, Argentina in 1968. He studied architecture and urban planning at the University of Buenos Aires. Together with Pio Torroja he is cofounder of m7red. m7red is an independent research platform based in Buenos Aires. Since 2005 it is focused on formatting complex scenarios by building up strategic

associations with activists, grassroots communities and experts from several domains.

Professor Ashley Dawson is professor of English at the City University of New York's Graduate Center and at the College of Staten Island/CUNY. He is the author of the *Routledge Concise History of Twentieth-Century British Literature* (2013) and *Mongrel Nation: Diasporic Culture and the Making of Postcolonial Britain* (Michigan 2007), and co-editor of three essay collections: *Democracy, the State, and the Struggle for Global Justice* (Routledge 2009); *Dangerous Professors: Academic Freedom and the National Security Campus* (Michigan 2009); and *Exceptional State: Contemporary U.S. Culture and the New Imperialism* (Duke 2007).

Dr. Ben Dibley is a research associate at the Institute for Culture and Society, the University of Western Sydney. He has research interests in social and cultural theory, particularly around questions of colonialism, museums and the environment. He has recent publications in *Australian Humanities Review; History and Anthropology; Museum and Society* and *New Formations*.

Dr. Scott East is the Director of Student Experience at UNSW Australia Art & Design where he teaches in museum studies & art theory. Scott completed his PhD investigating museum roles in communicating change at the Institute of Culture and Society, University of Western Sydney as part of the Australian Research Council Linkage grant *Hot Science Global Citizens*.

Dr. Christine Hansen is a Swedish Research Council scholar in the Department of History, Gothenburg University. She is currently working on the environmental/social history project "People of the Flume: Adapting for Fire in South-Eastern Australia." Her previous research with the Centre for Environmental History at the Australian National University resulted in the co-authored book with Tom Griffiths, *Living with Fire: People, Nature and History in Steels Creek* (CSIRO 2012). She was previously a curator at the National Museum of Australia.

Dr. Nigel Helyer is an internationally prominent sound artist. His interdisciplinary practice combines art and science to embrace our social, cultural and physical environments. He brings these concerns together in poetic art projects that prompt the community to engage with their cultural histories, identity and sense of place; inviting us to examine the abstract conditions of our world and our complex relationships to it. His work can be viewed at http://www.sonicobjects.com.

Professor Bob Hodge is a research professor at the Institute for Culture and Society at the University of Western Sydney, Australia, with a doctorate

from Cambridge, UK, and Fellow of the Australian Academy of the Humanities. He has published widely in the interdisciplinary humanities, with twenty-one books and many articles.

Professor Mike Hulme is professor of climate and culture in the Department of Geography at King's College, London. His work explores the idea of climate change using historical, cultural and scientific analyses, seeking to illuminate the numerous ways in which climate change is deployed in public and political discourse. He is the author of *Can Science Fix Climate Change? A Case against Climate Engineering* (Polity 2014); *Exploring Climate Change through Science and In Society* (Routledge 2013); *Making Climate Change Work For Us* (Cambridge 2010) and *Why We Disagree about Climate Change* (Cambridge 2009). This latter book was chosen by *The Economist* magazine as one of its science and technology books of the year. From 2000 to 2007 he was the Founding Director of the Tyndall Centre for Climate Change Research, based at the University of East Anglia, and since 2007 has been the founding Editor-in-Chief of the review journal *Wiley Interdisciplinary Reviews (WIREs) Climate Change*.

Dr. Luke Keogh was a curator on the special exhibition *Welcome to the Anthropocene. The Earth in Our Hands* at the Deutsches Museum. This position was part of the German-wide International Curatorial Fellowship program funded by the German Federal Cultural Foundation. He is a currently a visiting fellow at the Rachel Carson Center for Environment and Society, Ludwig Maximilian University, Munich, Germany.

Dr. Mary-Anne Lea is a senior research fellow at the Institute for Marine and Antarctic Studies, University of Tasmania, Australia. She undertakes research into the behavioral ecology, migration and habitat use of high-latitude seals, penguins and seabirds in relation to environmental, climate and anthropogenic influences.

Dr. Tim Mansfield has been working as a futurist at the intersection of research and commercial practice since 2008. He has led futures visioning workshops for KPMG, AIMIA, Woolworths, AMP and Fairfax Digital. He is also an enthusiastic and thought-provoking speaker about social and technological trends in the emerging future who has spoken at Westpac, KPMG and to many academic audiences. In addition to his work with Action Foresight, Tim is a Senior Research Scientist at Queensland University of Technology in the Smart Services CRC. Before joining QUT, he worked at NICTA on systems for intense collaboration; developed the initial prototype of the ABC's Pool media-sharing environment and spent ten years working in collaboration and social media research at DSTC, the Enterprise Distributed Systems CRC. He holds a PhD in Computer Science from the University of Queensland.

Professor Richard Maxwell is a political economist of media and professor of Media Studies at Queens College, City University of New York. He has published widely on a range of topics: media and the environment; broadcast reform during Spain's democratic transition; Hollywood's international dominance; media politics in the post-9–11 era; marketing research and the surveillance society; and the impact of political economic forces in daily life and culture. His recent work includes *Greening the Media* (with Toby Miller, Oxford University Press 2012); *The Surveillance Dossier* (editor); *Social Text 83* (2005); *Global Hollywood 2* (with Toby Miller, Nitin Govil, John McMurria and Ting Wang, British Film Institute 2005); *Herbert Schiller* (Rowman & Littlefield 2003); *Culture Works: The Political Economy of Culture* (editor, University of Minnesota Press 2001).

Professor Toby Miller is Emeritus Distinguished Professor at the University of California, Riverside, the Sir Walter Murdoch Professor of Cultural Policy Studies at Murdoch University and Professor of Journalism, Media and Cultural Studies at Cardiff University/Prifysgol Caerdydd. He has authored several books and numerous articles on topics from media, sports, labor, gender, race, citizenship, politics and economics. He is a guest commentator on television and radio programs across the globe. Prior to his academic career, Miller worked in broadcasting, banking and civil service.

Dr. Nina Möllers is currently project leader and curator of the Anthropocene exhibition scheduled to open in 2014 at the Deutsches Museum in Munich, Germany. The exhibition is a joint effort of the museum and the Rachel Carson Center for Environment and Society, a center for interdisciplinary and international environmental studies. Nina studied in Palo Alto, Tübingen and Nashville and received her PhD from the University of Trier in American History. She has worked at the Museum of Technology and Labor in Mannheim (Technoseum) and was a postdoctoral researcher and coordinator of a research and exhibition project on household energy consumption at the Deutsches Museum. Her research interests are the history of technology; environmental, gender and museum studies; and the American South.

Professor Brett Neilson is professor and Research Director at the Institute for Culture and Society, University of Western Sydney. With Sandro Mezzadra he is author of *Border as Method, or, the Multiplication of Labor* (Duke University Press 2013). He is currently leading a tricontinental research project entitled *Logistical Worlds: Infrastructure, Software, Labour* (http://logisticalworlds.org).

Dr. Tina-Simone Neset is an assistant professor and head of the research group on climate visualization at the Centre for Climate Science and

Policy Research, Linköping University. She holds a PhD in Water and Environmental Studies and has an extensive research background on nutrient flows and scenario assessments for sustainable resource flows. She is the research leader for the CSPR cluster on Land-Use & Energy and leads several ongoing research projects on climate and sustainability visualization, land use and agriculture, including the development of visualization tools for climate and phosphorus scenario data.

Kellie Payne is a PhD student at the Open University contributing to the *Mediating Change Project*, investigating the relationship between culture and climate change. Previously Kellie worked in research communications in the area of agriculture and the environment.

Gareth Priday is a futures researcher and practitioner. His work with Action Foresight has focused on training foresight methods in the Bendigo project and leading the experimental "Foresight Epidemic" project combining futures methods and social media. Alongside his work at Action Foresight, he is employed as a futures researcher at the Queensland University of Technology in the Smart Services CRC and is published in the *Journal of Futures Studies* and presented at conferences and workshops. Gareth's first career was in the financial services sector in the UK and Australia (Royal Bank of Scotland, UBS Warburg, ABN Amro, Macquarie Bank, NAB). Gareth holds a Master of Management (Strategic Foresight) from Swinburne University and a BSc in Physics from Bristol University in the UK.

Dr. José Ramos is a social change researcher, strategist and founder of Action Foresight. He has coordinated research, projects and change initiatives at municipal, state and international level for bodies such as the Heinrich Böll Foundation (Germany); the Organisation for Islamic Cooperation (Pakistan); the Victorian Council of Social Services (AU) and the cities of Port Phillip and Bendigo (AU). He has held academic roles at the National University of Singapore (NUS); Swinburne University; Leuphana University (Lüneberg, Germany) and Victoria University, and run intensive courses on strategic foresight for the University of Melbourne. His PhD dissertation examines alternative globalization and he has written and published over thirty journal articles and reports in the areas of innovation and enterprise, emerging futures, communication, sustainability and organizational development. He is senior consulting editor for the *Journal of Futures Studies* (jfs.tku.edu.tw).

Dr. Juan Francisco Salazar is a senior lecturer in Communication and Media Studies at the School of Communication Arts and a researcher at the Centre for Cultural Research, University of Western Sydney. Dr. Salazar's research interests and areas of expertise include: media anthropology; community and alternative media; Indigenous media and communication

rights; communication and social change, ICT's in education and intercultural dialogue; cultural imaginations of Antarctica and Latin American cultural studies. He lectures on screen media arts, and in theories and practices of convergent media, including experimental arts and documentary video. He has collaborated with a wide range of community media/arts organizations and artists including several local councils in Western Sydney and activist groups, and Indigenous organizations in Chile and Mexico. He has been involved and coordinated several consultancy projects and evaluations, for a range of organizations including UNESCO and Chilean government agencies and non-for-profit foundations. He is an international coordinator of the OURMedia Network since 2004 and is associated with the Latin American Council of Indigenous Film and Communication (CLACPI).

Ola Uhrqvist is a PhD student within the Earth System Governmentality project at the Centre for Climate Science and Policy Research (CSPR) and Department of Water and Environmental Studies at Linköping University. He studies how the Earth System and the Anthropocene was rendered as thinkable, knowable and governable by research coordinated by the International Geosphere-Biosphere Program and the International Human Dimensions Program on Global Environmental Change.

Tarisi Vunidilo has a MSc in Anthropology; a Postgraduate Diploma in Maori and Pacific Development from the University of Waikato, Hamilton, New Zealand; a Postgraduate Diploma in Arts, majoring in Archaeology, Australian National University, Canberra and a BA in Geography, History and Sociology, University of South Pacific, Suva, Fiji. She has published a book and several articles about Fijian pottery and archaeology. She was Programs Advisor, Pacific Arts, Creative New Zealand; Collections Services Manager, Waikato Museum of Art & History; Collections Manager of Pacific Collection at Te Papa Tongarewa, Museum of New Zealand and Head of the Archaeology Department at the Fiji Museum. She is currently the Secretary-General for the Pacific Islands Museums Association (PIMA) and works between her office in Port Vila, Vanuatu and Auckland, New Zealand. She is also pursuing her PhD in Pacific Studies on the topic of "iYau Vakaviti-Fijian Treasures, Cultural Rights and Repatriation of Cultural Materials from International Museums," at the Centre of Pacific Island Studies at the University of Auckland (New Zealand).

Professor George Yúdice is professor of Modern Languages and Literatures and Latin American Studies at the University of Miami. He is also Director of the Miami Observatory on Communication and Creative Industries. George is the author of *Cultural Policy* (with Toby Miller, Sage 2002); *The Expediency of Culture: Uses of Culture in the Global*

Era (Duke University Press 2003); *Nuevas tecnologías, música y experiencia* (Gedisa 2007) and *Culturas emergentes en el mundo hispano de Estados Unidos* (Fundación Alternativas 2009). He has published more than 130 articles. He is or has been on the editorial board of *Encounters; International Journal of Cultural Policy; Cultural Studies; Found Object; Lugar Comum; Topía: Canadian Journal of Cultural Studies, Social Text* and *Z Cultural*. Among his current research interests are cultural policy; music and audiovisual industries; new media and rethinking aesthetics in the age of social media.