THE DIALECTIC OF CLIMATE CHANGE: APOCALYPSE, UTOPIA AND THE ENVIRONMENTAL IMAGINATION

By

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CHAPTER I

INTRODUCTION

There is a tendency for those involved in public discourse about climate change, from politicians and pundits to climate scientists and corporate public relations firms, to engage in a rhetorical strategy of attempting to distinguish science "fiction" from science "fact" in the global warming debate. These terms, "fact" and "fiction," are deployed colloquially, with a casualness that conceals their conceptual significance to climate change discourse. Consider UN Secretary General Ban Ki Moon's November 2007 address to the IPCC, upon the release of the Fourth Assessment Synthesis Report: "These scenes are as frightening as a science fiction movie. But they are even more terrifying because they are real." Similarly, after the 2006 publication of Sir Nicholas Stern's review of the likely economic impacts of climate change, British Prime Minister Tony Blair declared the predictions the most important report on the future published by the Government since it came to power in 1997. Blair, like Moon, described the report as "terrifying," and said, "This disaster is not set to happen in some science fiction future many years ahead, but in our lifetime." Drawing upon the imaginative power of science fiction to make their point, Moon and Blair simultaneously re-inscribe popular notions of science fiction as disconnected from practical concerns.

Within literary studies, and even within the field of "Literature and the Environment," little attention has been paid to the important role of science fiction in constructing an "ecological imagination" for the 21st century, and even less consideration has been given

to discourses of climate change per se. In their anthology, *Beyond Nature Writing* (2001), Karla Armbruster and Kathleen Wallace argue that ecocriticism must move beyond its predilection for "nature writing" -- beyond creative non-fiction essays exploring and celebrating the human place in nature, such as those by Henry Thoreau, John Muir, Annie Dillard, Barry Lopez and others. Motivated by a postmodern critique of the concepts of "nature" and "wilderness," this shift in literary critical methodology resonates in historically significant ways with the conceptual and political challenges that anthropogenic global climate change poses for reconsidering the human relationship to the non-human world. Of the articles collected in *Beyond Nature Writing*, however, only one addresses science fiction, and none deal explicitly with climate change.

In his 1959 Rede lecture at Cambridge, C.P. Snow famously criticized the mutual suspicion and incomprehensibility developing between the two cultures of the sciences and the humanities. In a different context three years later, in her expose of the dangers of DDT, Rachel Carson lamented what she saw as an over-specialization within the sciences. For Carson, there were not just two cultures failing to communicate, but many. Since the 1970s, climate change, perhaps more thoroughly than any other environmental concern, has forced an ecological interdisciplinarity back into the natural sciences. What has been less clearly recognized, however, is that the challenges of global climate change also reach across the two culture divide. The most significant variables in models of possible future climates involve humans and how we choose to respond to our situation. How we conceive of ourselves, what we imagine we might do, socially, economically, politically, in our land use patterns and our transportation habits, matters significantly. Constructing potential emissions scenarios is fundamentally a storytelling project.

Science fiction, by definition a genre that bridges the two culture divide, is well-positioned to tell these stories; indeed, science fiction acts as an oft-unacknowledged source and supplement to scenario-thinking in scientific and policy realms.

This dissertation offers a consideration of the place of science fiction within climate change discourse and a meditation on the significance of climate change within literary discourse. The popular distinction between science fact and science fiction oversimplifies both terms, re-casting them as synonyms for truth and falsity. The desire for this distinction results from naïve positivism with regard to the character and purpose of the scientific method, and it produces a narrowing of the imaginative and descriptive possibilities of fiction. The science of climate change is, in large part, a narrative endeavor, and it is the shape of this narrative that is being contested in debates over climate change rhetoric and how to frame global warming concerns.

Long relegated to the margins of criticism, I argue that science fiction is the central genre of climate change. Scenario thinking, of increasing complexity and realism, is the goal for political policy making and corporate strategizing with regard to climate change and other risk-filled possibilities. Likewise, this is the goal of at least one strand of literary science fiction. Thinking about climate change is an imaginative project, and novelists may well hold the key to describing its potential consequences in ways that make climate change personally significant.

Climate change has the narrative potential, it seems, to disrupt the status quo – to offer a window of time within which change, whether political, social, economic, or personal, is possible, if only because it has become necessary. The changes essential for a transition to sustainability, James Gustave Speth suggests, require a broad shift in

consciousness prompted by a sober consideration of crisis, out of which emerges not a fortress mentality, but a new world vision – the articulation of a narrative that offers an alternative to the current structure of global capitalism and still resonates with traditional values of community, health, and connection to nature. As science fiction author Kim Stanley Robinson argues in his short essay "Imagining Abrupt Climate Change,"

> climate change has struck our species before, and we have adapted…in these past crises, even prospered. It could happen again...; no reason to despair; no reason to deny all problems and carry on stupidly in our destructive ways and ridiculously unjust economic system; rather, time to adapt…. But the story of that adaptation has to be told, and told many times over, I think, so we can imagine it better, and see how we might take the first small steps. (IACC, 18)

Expanding the boundaries of ecocriticism involves a reconsideration of science fiction, an archaeology of the future that includes a study of environmental apocalypse and utopia. This dissertation is a first step towards that process.

In Chapter 1, I offer three terms as essential for cultural criticism in the 21st century: *climate change*, *apocalypse*, *utopia*. I present a genealogy of each term along with reflections on the ways in which these terms acquire unique resonances in relation to one another. These essays offer a theoretical framework that operates heuristically in the chapters that follow, as I develop a more textured analysis of the ways these concepts play out in particular novels, films, scientific articles, and public policy documents.

Chapter 2 develops an analysis of three fictional representations of climate change -- T.C. Boyle's *A Friend of the Earth* (2000), Margaret Atwood's *Oryx and Crake* (2003) and *The Year of the Flood* (2009), and Octavia Butler's *Parable of the Sower* (1993). All

three authors are concerned with articulating the phenomenology of climate change. Set in the diminished environment of 2025, Boyle's novel emphasizes the common generic ancestry of utopia and satire in its critique of radical environmentalism. Atwood's novels foreground concerns about biotechnology, while her narrative interrogates the social consequences of the polarization between the sciences and humanities identified by Snow. Butler's novel offers insight into the ways that climate change intersects with issues of race and gender, at the same time as it presents a narrative of sustainable community, arguing for the possibility of emancipatory agency even within a dystopian world.

Chapter 3 presents an analysis of three 2004 representations of *abrupt* climate change in the context of Bush administration policies toward climate change and in the wake of the September 11 terrorist attacks. Abrupt climate change is a low probability, high risk scenario, and stands outside the scope the IPCC reports. Beginning with a 2003 Pentagon-sponsored report on abrupt climate change, this chapter considers the practice of scenario-thinking and its relationship to science fiction. Close readings of Roland Emmerich's film *The Day After Tomorrow* (2004), Michael Crichton's novel *State of Fear* (2004), and Kim Stanley Robinson's novel *Forty Signs of Rain* (2004) illuminate the distinctive contours of the eco-political imagination taking shape during this time. *The Day After Tomorrow* foregrounds spectacle over science, mapping the rhetoric of nuclear catastrophe onto climate change. *State of Fear* operates as a rebuttal and palliative, suggesting that global warming is unproven theory and overstated threat. Kim Stanley Robinson's *Forty Signs of Rain* imagines a scientifically nuanced abrupt climate change scenario and the policy measures necessary to adapt successfully.

Chapter 4 opens up into a consideration of Kim Stanley Robinson's larger oeuvre. I begin with a review of Robinson's award-winning *Mars* trilogy, *Red Mars* (1993), *Green Mars*, (1994), and *Blue Mars* (1997). Robinson's experiments with purposeful terraforming on Mars implicitly critique the accidental terraforming that anthropogenic climate change produces on Earth, and they anticipate the problematic geoengineering solutions proposed in the *Science in the Capital* trilogy. Next, I focus on a full analysis of Robinson's *Science in the Capital* trilogy. After *Forty Signs of Rain*, Robinson published *Fifty Degrees Below* (2005) and *Sixty Days and Counting* (2007). Thematically, the last two novels are largely concerned with a presidential transition of power and the potential for systemic change that comes with it. Published in the years leading up to the 2008 presidential elections, they are positioned to directly engage public and political discourse on climate change. The title of the final novel refers to the first sixty days of the new presidential administration, and the novel models one set of policy shifts that might effectively confront the challenge of climate change. Characteristically, Robinson illuminates alternative economies and social arrangements in these novels, but more clearly than his speculations in the Mars trilogy, Robinson's *Science in the Capital* trilogy, set in an alternate present, emphasizes utopian experiments already in existence. Arguably then, Robinson shifts generic modes, moving from utopia to manifesto.

In addition to the IPCC, the UN also sponsors two other assessment initiatives that employ scenario thinking – the Global Ecosystem Outlook Reports (GEO), and the Millennium Ecosystem Assessment (MA). These scenarios perform many of the same discursive functions that characterize science fiction: they deploy what Darko Suvin terms a novum in order to prompt a cognitive estrangement that produces an implicit

critique of our current socio-politico-technological landscape, and they suggest the possibility of radical structural reform. Reading science fiction alongside these scenarios allows us to ask, in what ways are problematic assumptions and abstractions built into these models? Science fiction, as source and supplement to scenario literature, retains enduring value because of its concern with singularity. In the end, I argue for the importance of utopia as a participatory project and a methodology, over and above any particular literary work.

CHAPTER II

KEYWORDS

Scientific developments can define meaningful benchmarks in the history of aesthetics and literature. The science of climate change, begun speculatively in the late 19th century, and articulated over the last forty years with the help of increasingly sophisticated models and diverse data sources, marks such a shift in the cultural imaginary. The science of climate change prompts us to imagine our own planet as another world—to imagine ourselves inhabiting a fundamentally altered environment—and it asks that we recognize a human role in engineering that world. As we enter the 21st century, it is incumbent upon literary scholars to reconsider the changing contours of cultural discourse in light of these developments in climate science.

Raymond Williams describes *Keywords* as a work that takes place in an "area where several disciplines converge but in general do not meet. It has been based on several areas of specialist knowledge but its purpose is to bring these, in the examples selected, into general availability" (17). The interdisciplinarity of Raymond Williams' work, published just over a decade after Rachel Carson's appeal for integrative thinking in *Silent Spring*, might meaningfully be thought of as ecological in its approach. Significantly, Williams included "ecology" in his 1983 edition of *Keywords*.[1] My project in this chapter occupies a similarly interdisciplinary space and has similar aims. My

[1] John Bellamy Foster has argued that an ecological perspective is characteristic of Marxist analysis. See *Marx's Ecology* (2000) for an account of Marx's concern with agriculture and soil ecology.

purpose is to update and elaborate our critical lexicon in light of what might be understood as a paradigm shift in the human understanding of planetary ecology. My analysis emerges from the intersections of political economy and the physical sciences, literature, history, and culture theory. In the open-ended spirit of Williams' work, I offer the following three terms as essential vocabulary for cultural criticism in the 21st century: *climate change*, *apocalypse*, *utopia*. In elucidating these terms, I hope to contribute a toolbox of concepts for use in understanding the relationship between literary and cultural production, economics, and ecology in the 21st century.

This keyword vocabulary is, in part, a remediative project. Ecocriticism has just begun to think productively about climate change, despite its emergence as a school of analysis in the same decade as global warming gained widespread media attention.[2] Ecocritics have only begun to interrogate the apocalyptic rhetoric employed by environmentalists, and they have yet to theorize utopia, perhaps because that term seemed so out of fashion in American intellectual thought at the end of the twentieth century. A critical awareness of each of these terms is urgent for ecocriticism in the 21st century. My aim is to make the use of these terms—*climate change*, *apocalypse, utopia*--at once critical and constructive.

First, I construct a history of *climate change* research extending back to the 19th century. Approaching the present, I focus on the publication of the IPCC Assessment Reports as a documentary of a growing scientific consensus on climate change as well as a discursive space in which the highly politicized significance of key scientific terms is

[2] James Hansen's 1988 testimony before Congress about global warming marks the beginning of widespread media attention to climate change. The Association for the Study of Literature and Environment (ASLE) was formed in 1992.

formally negotiated. In particular, I argue that the IPCC emissions scenarios are where science fiction meets science fact. The IPCC maintains a database of over 400 emissions scenarios, articulated at various regional and global scales, some of which are policy neutral and many of which are policy proscriptive. These qualitative scenario storylines are entered into GCM computer models for forecasting global climate, and they emerge as quantitative information. I argue that the possible futures represented by these emissions scenarios tend to be articulated within either an apocalyptic or a utopian generic frame.

Next, in my consideration of *apocalypse*, I untangle the common conflation of apocalypse and catastrophe, emphasizing the etymological understanding of apocalypse as an "unveiling." Climate change might best be understood as apocalyptic in this sense; it reveals structures of power in new ways, offering the opportunity for scrutiny and revision. I acknowledge the place of apocalyptic narratives in culture wars and their coincidence with religious and ideological extremism, and I comment upon the use of apocalyptic rhetoric in environmentalist discourse. I distinguish between tragic and comic apocalyptic frames, and I highlight the colloquial elision of a utopian element characteristic of traditional apocalyptic narratives, arguing that apocalypse and utopia should properly be understood in dialectical relation to one another.

Finally, in my consideration of *utopia*, I distinguish between the pejorative senses of the term, in which utopian is taken to mean impractical or coercive, and the reconstructive sense of the term, in which utopianism is understood as an ongoing project of imagining and enacting a better world. I emphasize the shapes utopianism took in the American context in the 19th and early 20th centuries, arguing for an important and

unrecognized connection between utopianism's critique of industrial capitalism and the development of environmentalism in the United States. By the mid-20th century, however, utopianism took on totalitarian connotations and became less popular in political discourse, until, with the end of the Cold War, utopianism was deemed largely irrelevant. I argue for a recovery of the utopian project, following Fredric Jameson's defense of utopia in the historical moment of late-capitalism. Jameson formulates the phrase anti-anti-utopianism to describe the self-conscious formal experimentation of American science fiction writers like Samuel Delaney and Ursula LeGuin. In its playfulness with the forms and limits of utopian thought, the aim of anti-anti-utopian writing is to free the imagination from the present. Erin McKenna articulates the positive complement to Jameson's double negative, recommending a "process model of utopia," based on a feminist reading of Dewey's theorization of democracy, emphasizing experimentalism and the cultivation of flexible and critical habits of mind.

Climate Change

Meteorologically speaking, the term "climate," whether the climate of a specific region or of the Earth as a whole, refers to the statistical average, over time, of the conditions that occur there. For example, with a sufficient archive of numerical measurements, it is possible for meteorologists to speak about the climate of Washington, D.C. in the following manner:

> In the month of November between 1971 and 2000 in Washington D.C., the average daily high temperature was 14˚ C, the average daily low was 1˚ C, and 0.3 cm of precipitation fell. These average values, along with averages of other

> meteorological quantities such as humidity, wind speed, cloudiness, and snow and ice coverage, define the November climate of Washington over this period. (Dessler and Parson 6)

Climate, then, is a quantified abstraction of sensuous experience, often reconstituted at scales different from that of human phenomenology. It is impossible to directly experience climate. Instead, what we experience is the weather. This distinction between climate and weather has implications for how climate change is communicated to the public. It is impossible, for example, to talk about a causal connection between changes in the climate and particular weather phenomena. Thus, while global warming might be characterized by more violent storms, climate scientists cannot say that Hurricane Katrina was caused by global warming. This is also an issue of representation. There is a degree of untranslatability in the charts and graphs that reveal climate trends. As a series of averages, indexes of world climate, Mike Hulme explains in *Why We Disagree About Climate Change* (2009), both hide and reveal – they hide the diversity of weather experienced in local places by local people, and at the same time, "by collapsing all this diversity into a single numerical index, [they reveal] the behaviour of a large and complex global system" (Hulme, 8-9).

What is climate change? What is global warming? In the first footnote of the IPCC's Fourth Assessment Report, the authors clarify that

> *Climate change* in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the Framework Convention on Climate Change, where climate change refers to a change of climate that is attributed directly or indirectly to human

> activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. (2)

The IPCC authors define climate change independently of anthropogenic or non-anthropogenic origins, whereas in the Framework Convention on Climate Change, the term exclusively denotes anthropogenic origins. Maintaining a purposeful broadness in their use of the term, the IPCC authors proceed to explain within the report that there is broad scientific consensus that the Earth is warming and that humans are contributing significantly to this warming.

In other contexts, the term global warming is used interchangeably with the term climate change. According to the Environmental Protection Agency website,

> Global warming is an average increase in the temperature of the atmosphere near the earth's surface, and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. (http://www.epa.gov/climatechange/basicinfo.html)

These definitions demonstrate a degree of slippage in the terms as they are used in both popular and scientific discourse, and they point to areas of inquiry and debate. The differences between the terms "climate change" and "global warming" ostensibly indicate a distinction between climate shifts in any direction and an overall warming trend. To use the term global warming, then, involves a more specific area of inquiry and a second level of conjecture. The EPA definition emphasizes this warming trend, and it embraces both anthropogenic and non-anthropogenic causes. The differences between these terms have rhetorical implications. The term global warming, for example, sounds more ominous than climate change, and yet it famously loses its affective impact during the

cold months of winter. In this dissertation, I use the terms climate change and global warming fairly interchangeably, and I include the anthropogenic hypothesis as a default connotation. The anthropogenic dimensions of climate change have profound implications for the ways that we understand ourselves as individuals and as communities, and they prompt a radical reconsideration of the human relationship to the non-human world.

Many histories of the science of climate change begin in the 19th century, with French scientist Joseph Fourier's hypothesis about what we have come to call the "greenhouse effect." Coincident with the industrial revolution, the 19th century provides a useful starting point for the story of climate change, although of course human attempts to understand the Earth's climate extend farther into the past. The etymology of the word "climate," as Mike Hulme points out, takes us back to ancient Greece, where as early as the sixth century BC, Parmenides used the word *klima* to differentiate between zones on the Earth's surface, from tropical to arctic. Moving forward to the 19th century, Hulme argues, our contemporary understandings of climate must also be understood in the context of European exploration and the instrument revolution of the 17th and 18th centuries. Hulme points to Alexander von Humboldt and American meteorologist Matthew Maury as important figures promoting the standardization of meteorological measurements that contributes to the shape of contemporary climate science (4-7).

In *The Discovery of Global Warming*, Spencer Weart highlights the role of British scientist John Tyndall tested, who in 1859 tested the opacity of gases thought to comprise the atmosphere. These were the first experiments to test Fourier's hypothesis that the Earth's atmosphere intercepts radiation emitted from the surface. As a part of the

experiment, Tyndall tested the methane-laden coal gas that was piped into his laboratory for lighting. The gas was opaque to infrared rays, and Tyndall discovered that CO2 was similarly opaque. Spencer Weart points to the irony of Tyndall's inspiration, writing, "thus the Industrial Revolution, intruding into Tyndall's laboratory in the form of a gas jet, declared its significance for the planet's heat balance" (3).

The name most associated with the early science of climate change is that of Swedish scientist Svante Arrhenius, who proposed that changes in atmospheric CO2 could have been responsible for past ice ages. The example of Arrhenius reminds us that speculation about climate change in the future is rooted in attempts to understand the prehistoric past.[3] There is, therefore, a kind of *deep*-historical sensibility involved in thinking about climate change. Arrhenius's hypothesis imagined a series of volcanic events as the major trigger for CO2 fluctuations, but in their compilation of CO2 emission source estimates, Arrhenius's colleague Arvid Hogbom included a calculation of CO2 emitted by factories and industry. This prompted a thought experiment – what if humans, through industrialization, doubled the CO2 concentration of the atmosphere? Arrhenius calculated that such an increase might raise the Earth's average temperature by as much as five degrees Celcius.[4] Arrhenius published his calculations in 1896, and his thought experiment takes on renewed significance as carbon emissions increase toward that very concentration. According to Spencer Weart, current global climate models

[3] Early speculations about climate change should be understood particularly in response to Louis Agassiz's ice age theory.

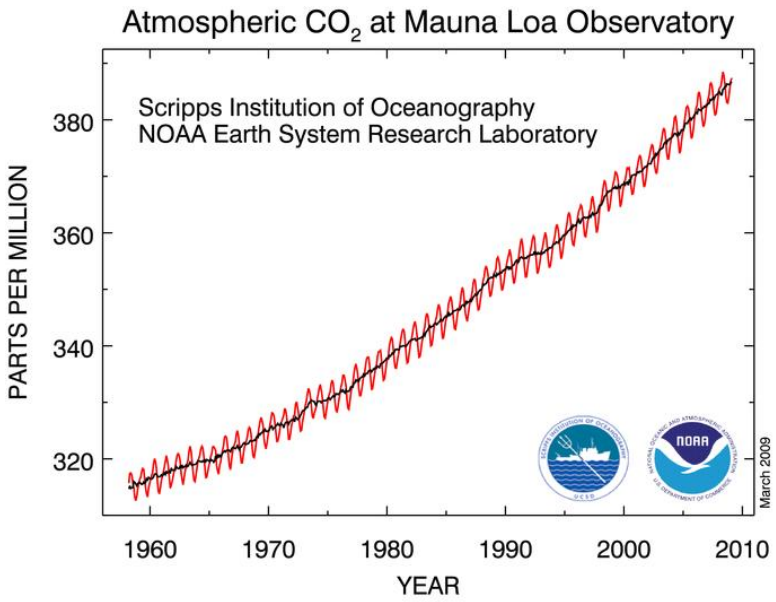
[4] Interestingly, Arrhenius presumed that such an increase in temperature would prove beneficial and would increase crop yields.

account for greater degrees of complexity in the climate system and estimate between two and four degrees Celcius for a similar increase in carbon dioxide (Weart 5-8).

Moving into the 20th century, Spencer Weart points to Guy Callendar, Charles David Keeling, and Roger Revelle as emblematic figures in the history of climate change research. In 1938, Callendar presented calculations linking anthropogenic CO2 emissions and global warming to the Royal Meteorological Society. An amateur scientist paid little heed at the time, Callendar was the first scientist to attempt to detect large-scale climate change and attribute that change to anthropogenic greenhouse gas emissions. In the second half of the 20th century, driven by World War II and the Cold War, considerable governmental funding went into improving scientific quantification of the Earth's atmospheric and ocean cycles, in order understand how nuclear fallout might be dispersed. Corresponding to the development of political institutions such as the United Nations, science also developed in international arenas. In particular, the International Geophysical Year in 1957-58 was influential in the development of climate-change science. Both Weart and Hulme point to Roger Revelle at Scripps Institution of Oceanography and Hans Seuss at the University of Chicago, who received funding to establish baseline atmospheric carbon dioxide measurements as a part of the IGY.[5] Revelle and Seuss hired Charles David Keeling to run their measurement experiments. Keeling set up sites at Mauna Loa Observatory in Hawaii and at the American scientific base in Antarctica. His measurements from these sites demonstrated that carbon dioxide

[5] In his report to Congress about the International Geophysical Year in 1957, Roger Revelle was one of the first to use the metaphor of a spaceship to explain our relationship to the planet, saying "the Earth itself is a spaceship." (Weart 43).

concentrations were rising steadily at both locations (Hulme 54). The graph of these ongoing measurements is dramatic:



In the 1970s and 80s, improvements in computer technology significantly influenced climate research. In the 1970s the development of new general circulation models (GCMs) of the global atmosphere improved climate simulations. Mike Hulme identifies Syukuro Manabe and Richard Wetherald at Princeton University as the developers of the first model to simulate a three dimensional response of global climate to a doubling of atmospheric carbon dioxide. In the 1980s, ice core samples from Greenland and Antarctica suggested the possibility of abrupt climate shifts in the past. In 1987, Wallace Broecker published his "Unpleasant surprises in the greenhouse?" in *Nature*, hypothesizing that a disturbance in oceaninc thermohaline circulation might cause a radical shift in climate (Hulme 56-57). This possibility of abrupt climate change occupies a special place in the popular consciousness, as we will observe in Chapter 3.

For the purposes of this dissertation, I want to focus in particular on the development of the Intergovernmental Panel on Climate Change (IPCC). In 1988, the IPCC was established by the World Meteorological Association (WMO) and the United Nations Environment Programme (UNEP) to assess the scientific, technical, and socio-economic information relevant for understanding of the risk of human-induced climate change. The IPCC is neither a strictly scientific nor a strictly political body, but a hybrid organization – a scientific body with strong links to politics (Weart 158). The IPCC was designed to provide an authoritative assessment of results from climate science as an input to policy makers. The IPCC's goal is not to conduct original science, but rather to synthesize the science that has been conducted around the world in policy-relevant ways.

The IPCC has published four major assessment reports and several other reports in its nearly twenty-five year history. According to Richard Somerville, one of the coordinating lead authors for the 2007 Report, these reports have expressed increasing certainty that human activity contributes significantly to global climate change and that climate change will become more serious in the years to come. The main writing of the Fourth Assessment Report was done by a team of 152 authors, chosen by the IPCC from more than 700 candidates nominated by governments.[6] Somerville describes the process of writing the 18 page Summary for Policymakers in this way:

> The IPCC first appoints a group of about 33 "Drafting Authors." We drafted a summary, the governments commented on our draft, we revised it, and they reviewed it again. Then, at an IPCC plenary held in Paris in early 2007, the

[6] Some interesting statistics about the Fourth Assessment Report authors include the following: 25% had earned their highest academic degree in the last 10 years; 75% were not previous IPCC authors, 35% were from developing countries and countries with economies in transition (Somerville 96).

> governments formally accepted the full report and then spent nearly a week approving the Summary. This approval process consists of a formal meeting (with full parliamentary procedure and simultaneous interpretation in the six official languages of the UN) lasting several long days, in which the governments consider the report line by line, and often word by word. (96-97)

The organizational structure of the IPCC demonstrates the interconnectedness of science and politics with regard to climate change, while the drafting procedure demonstrates the ways in which the language that is used to discuss the problem is politically charged.

I want to emphasize here that climate change has a history as an idea, that climate science has a history as a social enterprise. Moreover, this scientific history points to only one set of changing ways in which we think about the climate. Climate also operates figuratively. It is built upon and gives rise to metaphor. We might talk about trends in politics and the economy in terms of "climate," just as we might speak about the "atmosphere" of social spaces such as restaurants or movie theaters. In this way the term climate has both meteorological and metaphorical meanings, as Mike Hulme alliteratively argues. Science fiction author Kim Stanley Robinson has further suggested that when we talk about climate change, even in a scientific sense, we are engaging in a sort of metonymy. Climate change operates as an omnibus term signifying species extinction, ocean acidification, pollution, habitat loss, groundwater depletion, deforestation, desertification, soil loss, as well as other ecological consequences. Taken together, Robinson argues, what we are actually talking about is a general systems crash. Climate change, in its strictest meteorological sense, Robinson argues, is just one symptom of a much larger problem and project.

The historian Dipesh Chakrabarty argues that climate change has profound implications for the humanities. Chakrabarty begins with the thesis that "anthropogenic explanations of climate change spell the collapse of the age old humanist distinction between natural history and human history" (201). Chakrabarty takes inspiration for this claim from Paul Crutzen, a Nobel laureate chemist, and Eugene Stormer, and a marine scientist, who were the first to call the geologic era we live in "the Anthropocene" in order to emphasize the human impact on climate and ecology. Chakrabarty quotes Crutzen's 2002 article in *Nature*:

> For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behavior for many millennia to come. It seems appropriate to assign the term "Anthropocene" to the present,…human dominated, geological epoch, supplementing the Holocene—the warm period of the past 10-12 millennia. The Anthropocene could be said to have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784. (qtd in Chakrabarty, 209)

We see in Crutzen's history of the Anthropocene once again a coincidence with the industrial revolution. This coincidence is important, as climate change operates, I argue, in large part as a critique of industrial society. Focusing on issues of agency, Chakrabarty is particularly struck by the idea that humans have become what Naomi Oreskes terms "geological agents." Chakrabarty writes, "to call human beings geological

agents is to scale up our imagination of the human." Noting that humans have always been biological agents, he argues that "we can become geological agents only historically and collectively, that is, when we have reached numbers and invented technologies that are on a scale large enough to have an impact on the planet itself" (206-207).

Chakrabarty's second thesis is that "the idea of the Anthropocene, the new geological epoch when humans exist as a geological force, severely qualifies humanist histories of modernity/globalization" (207). It does so by calling into a new kind of question Western notions of freedom. Chakrabarty argues that "the mansion of modern freedom stands on an ever expanding base of fossil fuel use," and he explains that this fact has been elided in traditional accounts of modernity: "in no discussion of freedom in the period since the Enlightenment was there ever any awareness of the geological agency that human beings were acquiring at the same time as and through processes closely linked to their acquisition of freedom" (208). Western notions of freedom famously elide the unpalatable things upon which they depend, such as slavery, but Chakrabarty argues for a special way in which we have been blind to the consequences of our collective actions on the biosphere. Chakrabarty's point here has an analogy in the ecological critique of classical economics that it does not account for environmental externalities in its cost-benefit analyses. To the extent that our constructions of the market define our notions of freedom, we might say that the history of Enlightenment thought has similarly externalized the environmental consequences of the development of our modern conceptions of the individual.

Chakrabarty's third thesis is that "the geological hypothesis regarding the anthropocene requires us to put global histories of capital in conversation with the species

history of humans" (212). Climate change, Chakrabarty argues, forces a species understanding of humans that goes against the grain of a historical methodology that has emphasized the role of the individual and the collective in political and economic contexts that do not account for our geological agency. The ecological limits of the planet are, as yet, an unaccounted factor in histories of globalization; moreover, those limits are independent of politics and economy. Chakrabarty argues that "whatever our socioeconomic and technological choices, whatever the rights we wish to celebrate as our freedom, we cannot afford to destabilize conditions (such as the temperature zone in which the planet exists) that work like boundary parameters of human existence. These parameters are independent of capitalism or socialism" (218). Globalization and global warming might be born from overlapping processes, but they are not reducible to one another. Climate change, Chakrabarty argues, "will no doubt accentuate the logic of inequality that runs through the rule of capital…. But the whole crisis cannot be reduced to a story of capitalism. Unlike the crises of capitalism, there are no lifeboats here for the rich and privileged" (221). Chakrabarty is surely correct that climate change will accentuate the inequality that characterizes global capitalism, though I am less convinced of his assertion that the rich will not find ways to escape the damage and capitalize on the crisis.

Chakrabarty's fourth and final thesis is that "the cross-hatching of species history and the history of capital is a process of probing the limits of historical understanding" (220). This is once again an issue of representation and phenomenology. Chakrabarty puts it this way:

> We humans never experience ourselves as a species. We can only intellectually comprehend or infer the existence of the human species but never experience it as such. There could be no phenomenology of us as a species. Even if we were to emotionally identify with a word like *mankind*, we would not know what being a species is, for, in species history, humans are only an instance of the concept species as indeed would be any other life form. But one never experiences being a concept. (220)

This point is relevant to issues of agency and representation. Chakrabarty's argument about the difficulty of conceptualizing ourselves as a species is similar to the point that we cannot directly experience climate. Trying to conceptualize our collective impact on the planet's ecosystem coincides with an attempt to conceptualize ourselves as a species. There is a temporal and a spatial disconnect between cause and effect that exceeds individual human phenomenology. Susanne Moser describes this problem as a tension between "homo sapiens' brain versus homo technologicus' power" (34). As a species, the argument goes, we have evolved to make short-term decisions, while our technology has developed long-term consequences beyond the capacity of our decision making apparatus to understand and manage.

There are other challenges to representing climate change. In particular, there is the degree of complexity and uncertainty involved. Uncertainty in the science of climate change has many sources, including the scale, complexity, and unpredictability of chaotic systems like the atmosphere or the oceans. The most important source of uncertainty, however, results from humans being a part of the future in question. As Mike Hulme argues, "individual and collective human choices five, twenty or fifty years into the

future are not predictable in any scientific sense" (83). This is where literature comes into the study of climate change, and where the humanities have a role to play in understanding the future.

It will be instructive to return to the IPCC. The IPCC uses an analytical tool called scenario planning in order to talk about the future in policy relevant ways.[7] In scenario planning, a scenario is an account of a plausible future. Rather than trying to predict a specific future or to estimate the probability of particular outcomes, scenario planning uses a set of scenarios to explore the range of uncertainty surrounding the future consequences of decisions. Scenario planning was originally developed within the military as a strategic planning methodology. Herbert Kahn and the RAND Corporation developed scenarios to anticipate the possibility of various kinds of nuclear exchanges between the United States and the Soviet Union. Here again we see the influence of the Cold War and nuclear armament on the ways that we think about climate change. In the 1970s scenario planning made its mark in the corporate business world with Royal Dutch Shell's strategic planning team used scenarios to successfully navigate the oil crisis.[8]

Questions about what climate change will look like in the future present a unique entry point for scenario planning into scientific discourse. Future greenhouse gas emissions are a source of uncertainty, as they are dependent in large part on human factors, from policy proscriptions to technological development. In order to explore this

[7] While the IPCC generally steers clear of doing original research, the working group investigating emissions scenarios has generated a set of scenarios unique to the IPCC. Arguably, this is one area in which the IPCC is doing more than just assessment and synthesis.

[8] The scenario planning community is densely interconnected. Shell Oil was a pioneer of scenario planning, and several people involved with Shell have moved on to other organizations. A group of people from Shell and *Whole Earth* magazine, including Peter Schwartz and Stewart Brand, founded the Global Business Network, a scenario consulting firm. *Wired* magazine, a descendant of the *Whole Earth Catalog* via *CoEvolution Quarterly*, has published a number of articles on scenario planning.

uncertainty, the IPCC has developed a set of scenarios to represent a range of driving forces and emissions possibilities. The IPCC Special Report on Emissions Scenarios describes scenarios as "alternative images of how the future might unfold and an appropriate tool with which to analyse how driving forces may influence future emissions outcomes and to assess associated uncertainties" (3). The IPCC explicitly excludes outlying "surprise" or "disaster" scenarios. The authors warn that "any scenario necessarily includes subjective elements and is open to various interpretations. Preferences for the scenarios presented here vary among users" (3). They maintain a level of neutrality, if not objectivity: "No judgment is offered in this Report as to the preference for any of the scenarios and they are not assigned probabilities of occurrence, neither must they be interpreted as policy recommendations" (3). We shall return to this point, but for now, let us simply observe that there is a tension between the ideal of disinterested scientific experimentation and scenario construction, which is inevitably subjective, describing possible futures that will be interpreted differently by readers based upon their political persuasion, personal backgrounds and interests, or other relevant factors.

The IPCC explains that "Four different narrative storylines were developed to describe consistently the relationships between emission driving forces and their evolution and add context for the scenario quantification. Each storyline represents different demographic, social, economic, technological, and environmental developments, which may be viewed positively by some people and negatively by others" (3). Once again, the IPCC authors make the point that reader response will vary. What we further see in this description is that the IPCC scenarios are where science

fiction meets science fact. In the process of constructing the IPCC scenarios, qualitative storylines are entered into various computer models for forecasting global climate, and they emerge as quantitative information. I want to argue that this process of quantification participates in a larger rhetorical project – the numbers confer a sense of authority to the qualitative storylines at the same time as they prompt the reader to forget that these futures exist in the imagination. Our positivistic assumptions about the scientific enterprise anchor these numbers in 'the real.'

In order to quantify the storylines, the IPCC used six global circulation models, and each scenario represents a specific quantitative interpretation of one of four storylines. The IPCC refers to scenarios based on the same storyline as "families." The IPCC represents their scenario families with the following graphic illustration and explanation:

The main characteristics of the four SRES storylines and scenario families

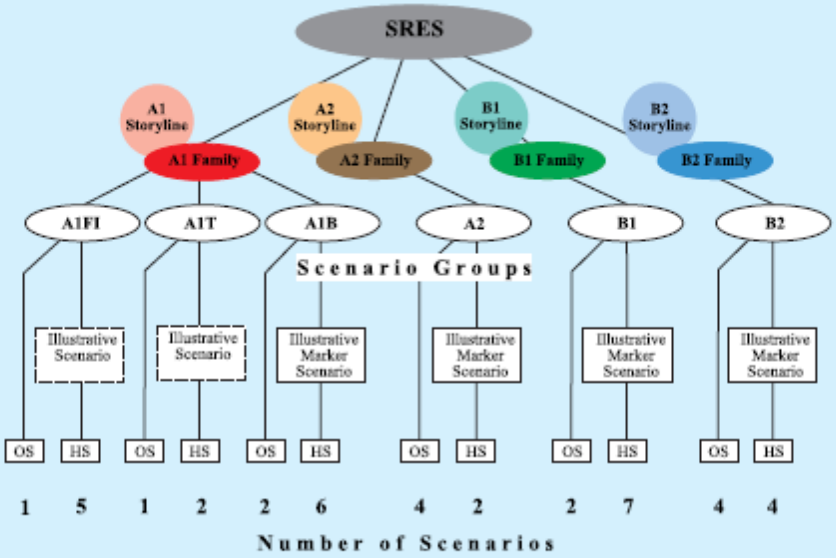


Figure 1: Schematic illustration of SRES scenarios. Four qualitative storylines yield four sets of scenarios called "families": A1, A2, B1, and B2. Altogether 40 SRES scenarios have been developed by six modeling teams. All are equally valid with no assigned probabilities of occurrence. The set of scenarios consists of six scenario groups drawn from the four families: one group each in A2, B1, B2, and three groups within the A1 family, characterizing alternative developments of energy technologies: A1FI (fossil fuel intensive), A1B (balanced), and A1T (predominantly non-fossil fuel). Within each family and group of scenarios, some share "harmonized" assumptions on global population, gross world product, and final energy. These are marked as "HS" for harmonized scenarios. "OS" denotes scenarios that explore uncertainties in driving forces beyond those of the harmonized scenarios. The number of scenarios developed within each category is shown. For each of the six scenario groups an illustrative scenario (which is always harmonized) is provided. Four illustrative marker scenarios, one for each scenario family, were used in draft form in the 1998 SRES open process and are included in revised form in this Report. Two additional illustrative scenarios for the groups A1FI and A1T are also provided and complete a set of six that illustrates all scenario groups. All are equally sound.

By 2100 the world will have changed in ways that are difficult to imagine – as difficult as it would have been at the end of the 19th century to imagine the changes of the 100 years since. Each storyline assumes a distinctly different direction for future developments, such that the four storylines differ in increasingly irreversible ways. Together they describe divergent futures that encompass a significant portion of the underlying uncertainties in the main driving forces. They cover a wide range of key "future" characteristics such as demographic change, economic development, and technological change. For this reason, their plausibility or feasibility should not be considered solely on the basis of an extrapolation of *current* economic, technological, and social trends.

- The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources (A1B).[3]

[3] Balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies.

- The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines.
- The B1 storyline and scenario family describes a convergent world with the same global population that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.
- The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social, and environmental sustainability. It is a world with continuously increasing global population at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented toward environmental protection and social equity, it focuses on local and regional levels.

(IPCC Special Report on Emissions Scenarios, 2000)

While these specific scenarios are unique to the IPCC, these scenarios are related to a larger body of scenario literature, and they align themselves with recognizable literary traditions. The scenario families that the IPCC and other scenario organizations describe align roughly with paradigmatic examples of 19th and 20th century utopian and dystopian literature. There are echoes in these storylines of Morris and Bellamy, Orwell and Huxley. In this way, scenarios are where politics intersects with climate science. The quantifications at the end of the scenarios are, to an extent, apolitical. How we arrive at those numbers is the political question.

To put the IPCC scenarios in context, it will be helpful to look at them alongside two other examples of scenario use. Garry Peterson et. al. provide a good synopsis of the history of scenario planning in their 2003 article "Scenario-Planning: a Tool for Conservation in an Uncertain World." In the 1970s, strategic planners at Shell famously used scenarios to investigate uncertainties in the global oil market. Contrary to expectations that oil prices would remain low, one of these scenarios envisioned a coalition of oil exporting countries limiting oil production in order to raise prices. The scenario planning exercise led Shell to increase the efficiency of its refining and shipping

operations in order to prepare for this possibility. When oil prices rose later in the decade, these changes allowed Shell to adapt more quickly than competitors. Similarly, in the 1980s, scenario planners at Shell explored the possibility of a decline in oil prices due to non-OPEC discoveries and conservation. Once again Shell adopted a business strategy at odds with prevailing opinion and outperformed its competitors, this time moving from one of the smallest multinational oil companies to the second largest (Peterson et al. 363). These examples illustrate the way in which the value of scenario planning lies in its capacity for exploring improbable futures. In this case, Shell is a minor character against a backdrop of world forces that are largely out of its control. The scenarios play out a variety of backdrops against which Shell might make decisions in its own best interests. There is also an interesting tension in this example. As a decision making tool, scenario planning claims to have value regardless of which future plays out. Scenario planning explicitly does not aim to predict the future, and yet this case is noteworthy precisely because Shell's scenario planning group did predict something close to the future that emerged.

In a different but related context, scenario planning was used in South Africa during the transition from apartheid. Leaders from South Africa's businesses, political groups, including senior ministers in the African National Congress, and civil society met in a series of workshops to discuss the driving forces shaping the country. Notably, the exercise was facilitated by members of the strategic planning group at Shell Oil. This is not just coincidence -- Shell has significant holdings off the South African coast. The participants developed four scenarios that were widely publicized around the country:

1.) Ostrich: in which negotiations to end apartheid fail and minority rule continues;

2.) Lame Duck: in which the negotiated transition to majority rule is slow, complicated, and indecisive;

3.) Icarus: in which the transition is successful, but the new government enacts unsustainable, populist economic policies leading to an economic crisis;

4.) Flight of the Flamingos: in which gradual improvement in the social and economic status of South Africans occurs as diverse groups work together. (Peterson et al. 363)

According to Peterson et al., "The aim of the scenarios was to enrich the negotiation process by creating shared awareness of some of the potential traps (e.g., excessive spending, an overly narrow focus on the details of transition, and insufficient change), and it improved the quality of the transition to democracy" (363). The Monte Fleur example is noteworthy in several respects. In this case, the workshop participants helped to create the scenarios, which operated as a set of shared political narratives. The participants were both author and audience. In this example, the workshop participants also played a large role as characters in determining the shape of the future that would play out. In contrast to the earlier example in which Shell Oil makes business decisions against a backdrop of world forces out of its control, in South Africa, the backdrop becomes the foreground. The shape of the future that plays out is more directly determined by the decisions of the scenario users.

The IPCC scenarios are global in scale and world-historical in scope. At this scale, there is some question as to who the users of these scenarios are meant to be. The

IPCC distinguishes between "end users" and "intermediate users" for their scenarios. End users are policy and decision makers who use scenario outputs in decision making processes, whereas intermediate users are researchers who use scenarios from another segment of the research community as inputs into their own work. Among potential end users for their scenarios, the IPCC identifies national governments, sub-global multinational decision making bodies (the European Union), global public and intergovernmental organizations such as the World Health Organization, private sector organizations at various scales, regional and local governments, non-governmental organizations and civil society organizations, and local communities (IPCC Towards New Scenarios 7).

In all of these scenarios, one finds a purposeful simplification and abstraction of the narrative. Global scenarios are concerned with agency at the level of the collective – corporations, nation states, occasionally a global citizen's movement. They are also concerned with identifying "drivers" – economics, technology, policy. Literary science fiction, on the other hand, retains an important concern with the individual. Some scenario literature suggests that scenario construction is an ongoing process, proliferating in various scales. So, while global metanarratives are one project, regional and local micronarratives are also a part of the mosaic.

None of these scenarios are truly disinterested. The storylines inevitably presume or imagine a certain politics; they can work to destabilize our conception of the world as it is, or they can work to naturalize it. I want to emphasize the importance of who writes and who uses these scenarios. As a reader, perhaps the most important question is what kind of agency one has access to within the story. There is a danger that the shapes these

narratives take might be overdetermined by the politics of their end-users. As we shall have more than one occasion to observe, disaster scenarios can be used to justify radical reform, and it is as often the case that these scenarios prophesy war and famine in ways that undergird nativist policy measures as it is the case that they imagine more creative solutions to social problems.

We should also consider the possibility of and desire for narrative actualization. In addition to a critical mode, there is a constructive mode within which these scenarios operate. In the process of anticipating particular futures, interested parties might consciously or unconsciously work to bring them into being. In the example of South Africa, the "Flight of the Flamingos" narrative served as an overt goal towards which the workshop participants and South African society might work. There is a way in which these narratives of the future guide our understanding of the present.

On the one hand, I want to make the philosophical point that all science has an important narrative component, and that science is shot through with metaphor. In this context, I want to emphasize the importance of thought experiment, conjecture, and theoretical science. On the other hand, I also want to argue for a special way in which narrative operates in the science of climate change through the use of scenario planning. Scenarios are also where literature intersects with climate science. Science fiction and scenario thinking are both written in the subjunctive mode. Science fiction acts as both source and supplement to scenarios in the scientific and policy realms, with enduring value because of its concern with singularity.

Scenario thinking argues for itself as the dominant generic mode of late modernity, and in many ways this seems accurate. The CIA employed screenwriters to

imagine scenarios around the capture of Osama Bin Laden. Scenario thinking is a mode of risk analysis, and as Ulrich Beck argues, our current era is that of a global, risk society. This risk analysis dimension to scenarios accounts for Richard Posner's seriousness in his cost-benefit analysis of Margaret Atwood's *Oryx and Crake*. Moreover, there is at work in all of this literature a dialectic of apocalypse and utopia.

In her article "Writing in the Anthropocene," Kate Rigby argues that contemporary environmental writers should write in the mode of "prophetic witness." Such writing, she argues, "would seek to disclose the catastrophic consequences of continuing on our current ecocidal path and awaken us to another way of thinking and being: one that holds the promise of reconciling urban industrial society with the Earth" (1). Rigby's underlying model here is biblical, and she builds her argument on an analysis of Judith Wright's poem "Dust," which operates, she argues, in this prophetic mode. Rigby ends with a call to action: "The challenge for writing in the anthropocene, in the shadow of ecocide,..is to find new ways of raising our voices from the level of 'idle chatter' to that of a biting and stinging ecoprophetic witness" (10).

Apocalypse

There is a distinctively apocalyptic strand to discussions of climate change. As an example, consider that Dipesh Chakrabarty begins his theses on climate change with a meditation on Alan Weisman's *The World Without Us.* Weisman's book builds from a thought experiment of human extinction: "Picture a world from which we have all suddenly vanished." It is interesting that Chakrabarty begins from this example -- Weisman's thought experiment comes closer to the rapture of Tim LaHaye's *Left Behind*

series than it does to any global warming scenario published by the IPCC. I take Chakrabarty to be making a narrative point about climate change and the limits of imagination – we perceive climate change as a kind of break in the historical narrative, or in scenario planning terms, a branch point in history. The future on the other side of this break remains, to a certain extent, unimaginable. And yet, Chakrabarty's use of Weisman's thought experiment also illustrates, in ways that he leaves largely unpacked, how popular conceptions of climate change intersect with older and deeper anxieties about the end of the world.

Apocalypse is an older idea than climate change. For at least 3,000 years, ecocritic Greg Garrard writes, "a fluctuating proportion of the world's population has believed that the end of the world was immanent" (85). Garrard locates the origins of apocalypticism in Zoroastrianism: "Notions of the world's gradual decline were widespread in ancient civilizations, but Zoroaster bequeathed to Jewish, Christian, and later secular models of history a sense of urgency about the end of the world" (85). Importantly, however, the word apocalypse has not always referred to the end-times. The etymological root of apocalypse is the Greek *apokalypsis*, meaning "unveiling" or "uncovering." I want to emphasize this etymological understanding of apocalypse. Climate change might best be understood as apocalyptic in this sense; rather than bringing about the end of the world, climate change offers a kind of heuristic frame. Through this narrative frame, we are made aware of formerly invisible structures of power, offering opportunity for scrutiny and revision.

The eschatological connotation of apocalypse developed as it became associated with the book of Revelation in the New Testament, which records the revelation of St.

John of Patmos. As a part of the Christian canon, the Revelation of St. John has contributed a set of images and a language through which Western culture has come to understand the end-times. Perhaps more importantly, the book of Revelation offers a way to understand the present as the end-times, and this is a powerful political narrative. In his *History of the End of the World*, Jonathan Kirsch writes that "the words and phrases of Revelation, its stock figures and scenes, have been recycled and repurposed by artists and poets, preachers and propagandists—all in service of some religious or political or cultural agenda" (3).

The apocalyptic genre as we know it today is the product of sociopolitical crisis, and it is a story of the end of empire. John of Patmos was likely a Jewish war refugee, viewing the occupying Roman army with contempt. In highly symbolic language, the book of Revelation prophesies the downfall of the Roman empire, and it played particularly well with audiences who resented Roman occupation. It is for this reason that D.H. Lawrence writes that Revelation "is above all what some psychologists would call the revelation of a thwarted "superiority" goal, and a consequent inferiority complex" (73). Lawrence argues that the book of Revelation "resounds with the dangerous snarl of the *frustrated, suppressed* collective self, the frustrated power-spirit in man, vengeful. But it contains also some revelation of the true and positive Power-spirit" (73). We shall return to Lawrence's acknowledgement of the positive side of Revelation, but let us remain with the critical side a little longer.

There is a deep psychological dimension to thinking about the end-times. According to Frank Kermode, apocalypse is "a pattern of anxiety that we shall find recurring, with interesting differences, in different stages of modernism. Its recurrence is

a feature of our cultural tradition, if not ultimately of our physiology" (96). Kermode's analysis builds upon D.H. Lawrence's argument that "We always want a "conclusion", an *end*, we always want to come, in our mental processes, to a decision, a finality, a full-stop. This gives us a sense of satisfaction. All our mental consciousness is a movement onwards, a movement in stages, like our sentences, and every full-stop is a mile-stone that marks our "progress" and our arrival somewhere" (93). Apocalypse, then, is not so much about predicting the end of the world as it is about making us feel as though we are a part of a critical moment in history. As Kermode succinctly puts it, "Crisis is a way of thinking about one's moment, and not inherent in the moment itself." (101) In *Apocalyptic Transformation: Apocalypse and the Postmodern Imagination*, Elizabeth Rosen explains that apocalypse "is an organizing structure that can create moral and physical order while also holding the possibility of social criticism that might lead to a reorientation in the midst of a bewildering historical moment" (xiii).

In popular culture, we have come to associate apocalypse with catastrophe, but in the Christian tradition, the apocalypse is both an end and a new beginning. After the great battle between good and evil, there follows the inheritance of a New Jerusalem and the 1,000 year reign of Jesus on Earth. Yet as scholars such as Elizabeth Rosen have noted, apocalyptic literature has evolved to include stories that lack this vital feature of the myth. Rosen argues that postmodern apocalyptic narratives have jettisoned the positive element that characterizes more traditional stories of apocalypse:

> these grimmer eschatological tales are strictly stories of endings. Such stories, which I am calling "neo-apocalyptic," are focused on cataclysm. They neither offer nor anticipate a New Jerusalem, per se. This form sees the apocalyptic

> genre's message of hope largely subsumed by its emphasis on destruction, even though the main intent of the traditional story of apocalypse was to provide its audience with hope of a better world. To this extent, then, neo-apocalyptic literature is a literature of pessimism; it functions largely as a cautionary tale, positing potential means of extinction and predicting the gloomy probabilities of such ends. If these tales exhibit judgment, it is of the sort that assumes that no one deserves saving and that everyone should be punished. The traditional optimistic conclusion and intent to inspire faith disappear in neo-apocalyptic literature, replaced by imaginative but definitive End scenarios. (xv)

The point I want to make here is that apocalypse and utopia are traditionally connected, but that contemporary understandings of apocalypse have severed that connection. Rosen's argument about neo-apocalyptic literature coincides with a colloquial conception of apocalypse that elides any positive vision. I want to make a similar argument in an environmental context. The narrative of climate change is frequently a narrative of environmental catastrophe, without any positive vision to balance the scales. We tend to think of climate change in terms of endings, rather than in terms of beginnings.

Much environmentalist discourse deploys apocalyptic rhetoric. Lawrence Buell has argued that "Apocalypse is the single most powerful master metaphor that the contemporary environmental imagination has at its disposal" (285). Greg Garrard devotes a chapter of *Ecocriticism* to apocalypse, and he points to several texts in the environmentalist canon that make extensive use of the trope, from Rachel Carson's *Silent Spring* (1962), to Paul Ehrlich's *The Population Bomb* (1972), to Al Gore's *Earth in the Balance* (1992) (Garrard 93). And in *An Inconvenient Truth* and elsewhere, Al Gore

frequently refers to watching the evening news about climate related weather catastrophes as taking "a nature hike through the book of Revelation."

This apocalyptic rhetoric tends to polarize responses. In *From Apocalypse to Way of Life,* Frederick Buell explains that "Since Rachel Carson, environmental crisis has rapidly evolved and substantially changed in form, not just in nature, but also in human discourse about it. Announcing itself as apocalypse, environmental crisis has been debunked, resisted debunking, has been reworked, and has been dramatically diversified and expanded, resurfacing in unusual new forms" (xii). Buell's analysis explicates the conservative response to environmentalism that emerged during the 1980s and 1990s. This anti-environmentalism, Buell argues, emerged as an aspect of the larger neo-conservative resurgence after the 1970s. Buell's history of anti-environmentalism includes figures and organizations like James Watt, Ronald Regan's Secretary of the Interior, Rush Limbaugh, Newt Gingrich, Elizabeth Whelan, co-founder of the American Council on Science and Health, Ron Arnold, Alan Gottlieb, Julian Simon, the Heritage Foundation, the Cato Institute, the Competitive Enterprise Institute, and others. Their standard line of attack has been to vilify environmentalists as "pathological crisis-mongers, Chicken Littles, apocalypse abusers, false prophets, joyless, puritanical doomsters, chic-apocalyptic neo-primitives, sufferers from an Armageddon complex, and toxic terrorists" (34). Despite this response, Buell argues, the discourse of environmental crisis has persisted and evolved, and retains value.

As powerful a structure as apocalypse is for understanding the world, it is also dangerous. The critique of environmental doomsayers should prompt at least this

reflection. Drawing upon Lawrence, and Kermode, Greg Garrard describes several characteristics of apocalyptic narratives worthy of consideration:

> the social psychology of apocalypticism that has historically inclined such 'embattled' movements to paranoia and violence; the extreme moral dualism that divides the world sharply into friend and enemy; the emphasis upon the unveiling of trans-historical truth and the corresponding role of believers as the ones to whom, and for whom, the veil of history is rent. But most importantly, for our purposes, apocalypticism is inevitably bound up with imagination, because it has yet to come into being. To use the narratological term, it is always 'proleptic'. And if, sociologically, it is 'a genre born out of crisis' it is also necessarily a rhetoric that must whip up such crises to proportions appropriate to the end of time. This dialectic in which apocalypticism both responds to and produces 'crisis' will be important in our evaluation of it as an ecocritical trope. (86)

Garrard is cautious in his approach to the deployment of apocalyptic rhetoric for environmentalist purposes. Apocalyptic rhetoric, he argues, polarizes people, engenders violence and paranoia, and produces crisis as much as it responds to it. At the same time Garrard, like Buell, sees both persistence and value in the narrative of environmental apocalypse. Garrard also highlights the proleptic character of apocalypse, the way that it is bound up with the imagination of the future. Apocalypse, in this way, bears a distinct resemblance to science fiction.

Interrogating further the relationship between positive and negative visions within apocalyptic narratives, Garrard distinguishes between tragic and comic apocalypse. Garrard draws upon rhetorician Stephen O'Leary to suggest that "the drama of

apocalypse is always shaped by a 'frame of acceptance' that may be either 'comic' or 'tragic.' The choice of frame will determine the way in which issues of time, agency, authority and crisis are dramatized." (87) O'Leary writes:

> Tragedy conceives of evil in terms of guilt; its mechanism of redemption is victimage, its plot moves inexorably toward sacrifice and the 'cult of the kill'. Comedy conceives of evil not as guilt, but as error; it's mechanism of redemption is recognition rather than victimage, and its plot moves not toward sacrifice but to the exposure of fallibility. (qtd in Garrard, 87).

Garrard highlights the characteristic features of tragic apocalyptic rhetoric in Rachel Carson's *Silent Spring*, for example: "the warning is presented in terms of absolute authority; the material threat is 'evil', and so, by association, are the authors of it; the consequences of failure to heed the warning are catastrophic, and the danger is not only imminent, but already well under way" (95). A comic frame of acceptance, on the other hand, sees a way through the catastrophe, or learns lessons from the experience of loss. This comic mode, Garrard argues, is more appropriate for environmental apocalypse, which, ideally, is "not about anticipating the end of the world, but about attempting to avert it by persuasive means" (99). Garrard argues that "Eschatological narrative…brings with it philosophical and political problems that seriously compromise its usefulness, especially in its radical, tragic form" (105).

Garrard asks, "is environmental 'crisis' unreal, a discursive construct worthy of deconstruction but not millennial panic?" (107). This is a central question with regard to climate change discourse. He concludes that

> Whilst the strategic dangers of such rhetoric may be identified along with its somewhat disreputable genealogy, its validity must ultimately be judged by a careful consideration of historical trends and from the variety of projections of, say, global population or climate change that legitimate scientific discussion will produce. Ecocritics must assess the scale and import of scientific consensus, and in the final analysis defer to it, even as they analyse the ways such results are shaped by ideology and rhetoric. (107)

Garrard argues here for the different kinds of authority that scientists and humanists have with regard to environmental crisis. I wish to qualify his argument that ecocritics must defer to scientific consensus, however, by suggesting that even the "variety of projections of…global population or climate change that legitimate scientific discussion will produce" are as much ideology and rhetoric as they are falsifiable scientific hypotheses. The distinction between the sciences and the humanities does not hold with regard to scenario planning.

In *Apocalypse and the Writings on Revelation*, D.H. Lawrence spends time discussing the oracles of the classical world:

> The old oracles were not supposed to say something that fitted plainly in the whole chain of circumstance. They were supposed to deliver a set of images or symbols of the real dynamic value, which should set the emotional consciousness of the enquirer, as he pondered them, revolving more and more rapidly, till out of a state of intense emotional absorption the resolve at last formed; or, as we say, the decision was arrived at. As a matter of fact, we do very much the same, in a crisis. When anything very important is to be decided we withdraw and ponder

> and ponder until the deep emotions are set working and revolving together, revolving, revolving, till a centre is formed and we "know what to do". And the fact that no politician today has the courage to follow this intensive method of "thought" is the reason of the absolute paucity of political mind today. (93-94)

Lawrence's description here offers some insight into how we might better understand scenarios about climate change as well as the apocalyptic frame within which environmentalists communicate global warming. These narratives are stories meant to help interpret uncertain times. They are not deterministic nor predictive; rather, they are imagistic, intended to inspire creative reflection.

In *Living in the End Times,* Slavoj Zizek argues that "the global capitalist system is approaching an apocalyptic zero-point. Its "four riders of the apocalypse" are comprised by the ecological crisis, the consequences of the biogenetic revolution, imbalances within the system itself (problems with intellectual property; forthcoming struggles over raw materials, food and water), and the explosive growth of social divisions and exclusions." (x). Zizek's use of the apocalyptic framework to understand contemporary social life points again to the heuristic power of the apocalyptic paradigm. At the same time, his description of the various contributing factors to our sense of crisis is reminiscent of Kim Stanley Robinson's sense that when we talk about climate change, we are talking about a much larger and more multi-dimensional crisis. Zizek uses Elizabeth Kubler-Ross's five stages of grief (denial, anger, bargaining, depression, and acceptance) to describe the reactions available within our collective social consciousness with regard to the "forthcoming apocalypse":

> The first reaction is one of ideological denial: there is no fundamental disorder; the second is exemplified by explosions of anger at the injustices of the new world order; the third involves attempts at bargaining ("if we change things here and there, life could perhaps go on as before"); when the bargaining fails, depression and withdrawal set in; finally, after passing through this zero-point, the subject no longer perceives the situation as a threat, but as the chance of a new beginning. (xi-xii).

Zizek's psychological analysis of collective response to crisis brings us to the other side of the dialectic of apocalypse and utopia and points again to the positive vision implicit in the traditional apocalyptic narrative. After passing through the zero point, Zizek argues, the subject perceives the chance of a new beginning.

Utopia

Under consideration in the relationship between apocalypse and utopia is a historical dialectic as well as a mythical narrative structure. Apocalypse and utopia are fundamental psychological categories for understanding the world. Furthermore, this dialectic arises from the dynamics of the natural world itself. It is a dialectic of death and rebirth. It is evident in the cycle of the seasons, and in the revolution of day and night.

In any discussion of utopia, it is necessary to distinguish between the pejorative senses of the term, in which utopian is taken to mean impractical or coercive, and the reconstructive sense of the term, in which utopianism is understood as a project of imagining and enacting a better world. The tension between these two interpretations is

central to utopian thought. Indeed, Thomas More's foundational text reminds us that the word 'utopia' contains this tension, at once the 'good place' and 'no place.'[9]

More's *Utopia* is the "eponymous prototype" for the genre. In "Science Fiction and Utopia: A Historico-Philosophical Overview," Carl Freedman argues that "there is probably no other comparatively abundant literary [genre] that can be traced so unambiguously—and often explicitly—to a single text" (72). He points to Swift's overt mention of More's text in his prefatory letter in *Gulliver's Travels* (1726), Samuel Butler's *Erewhon* (1872), William Morris's *News from Nowhere* (1890), Wells's *A Modern Utopia* (1905), and Ursula LeGuin's "ambiguous utopia," *The Dispossessed* (1974) as evidence of generic affiliation in title as well as form (72). Freedman argues that the texts that form the core of the utopian canon are Plato's *Republic,* Thomas More's *Utopia*, Tomasso Campanella's *City of the Sun*, and Etienne Cabet's *Voyage en Icare*.

If More coined the word, however, he was not the first to give form to the dream of a better world. In *The Shape of Utopia*, Robert Elliott argues that utopia is an aspect of a deeper and older tradition: "Insofar as utopia incorporates man's longings for the good life, it is part of a complex of ideas that includes the Golden Age, the Earthly Paradise, the Fortunate Isles, the Islands of the Blest, the Happy Otherworld, and so on. The archetypal text, at least for the Western world, is that of Hesiod" (4). Elliott suggests the connections between utopia and the Saturnalian festival, suggesting its carnivalesque

[9] Terry Eagleton calls Utopia "the most self-undermining of literary forms." "If an ideal society can be portrayed only in the language of the present, it risks being betrayed as soon as we speak of it. Anything we can speak of must fall short of the otherness we desire. Utopias rebel against the unimaginativeness of the present, and in so doing, find themselves simply reproducing it. All utopian writing is also dystopian…it cannot help reminding us of our mental limits in the act of striving to go beyond them" (23).

dimensions: "The uninhibited words of carnival are everywhere akin. This is the language of satire before satire becomes literature; it is preliterary as well as subliterary. These utterances are ritual gestures, marked off from real life by the parenthesis of the holiday" (14). Elliott's argument for the ritual basis of carnival helps us to understand utopia as a formal structure. Elliott explains how utopia and satire are related:

> Satire and utopia seem naturally compatible if we think of the structure of the formal verse satire, usually characterized by two main elements: the predominating negative part, which attacks folly or vice, and the understated positive part, which establishes a norm, a standard of excellence, against which folly and vice are judged. The literary utopia, on the other hand, reverses these proportions of negative and positive—as the Russian writer Eugene Zamyatin says, utopias have a plus sign—presentation of the ideal overweighing the prescriptive attack on the bad old days which Utopia has happily transcended. (22)

We can see in Elliott's description of the differences between satire and utopia a connection as well to apocalypse. Apocalypse and utopia are formally connected in a similar way to satire and utopia. Apocalypse is predominantly negative, but traditionally operates in the service of some positive vision, whereas utopia is positive, but often involves a negative aspect as well. As Jameson suggests, even the most positive utopian vision contains a catastrophe insofar as it involves a radical break from the present.

Carl Freedman argues for three important senses of the term *utopia*. The first sense refers to the literary genre inaugurated with More's 1516 text. The second, political-economic sense of utopia refers to the polemical writings of Marx and Engels in

which they deprecate alternative conceptions of socialism as "utopian," in contrast to their own "scientific" version. The "utopian socialists" included Robert Owen, Charles Fourier, Henri de St. Simon, Cabet, and others. Finally, Freedman argues, utopia has a hermeneutic sense. He locates this hermeneutic in the writing of the Frankfurt School, and particularly in the work of Ernst Bloch.[10] Freedman writes,

> For Bloch utopia is not so much a matter of description or planning as it is a way of thinking and of reading: a utopian hermeneutic construes fragmentary prefigurations of an unalienated (communist) future in the cultural artefacts of the past and present, including many that on the surface may not seem particularly progressive. Though it is possible to contrast critique and utopia, the latter...can be understood also as an aspect of critique. (73)

Freedman is not alone in drawing upon Bloch; Bloch's broad understanding of the utopian impulse in *The Principle of Hope* offers a basis for wide ranging cultural criticism – Jameson, for example, also draws heavily on Bloch. Bloch argues that the utopian impulse is a fundamental psychological response to a sense of lack in the world. Bloch finds expressions of the utopian impulse in myths and literature, but also in other cultural forms, from music to architecture.

Lyman Tower Sargent published his famous "Three Faces of Utopianism" in 1967. Sargent's essay offers terminological nuance, distinguishing between "eutopia," "utopia," "dystopia," and "anti-utopia" as categories of utopian thought. Sargent's definitions are worth rehearsing in this keywords context:

[10] *The Principle of Hope* was written in exile during the 1930s and published in the German Democratic Republic in the 1950s. The first English translation was published in 1986.

Utopianism—social dreaming.

Utopia—a non-existent society described in considerable detail and normally located in time and space.

Eutopia or positive utopia—a non-existent society described in considerable detail and normally located in time and space that the author intended a contemporaneous reader to view as considerably better than the society in which that reader lived.

Dystopia or negative utopia—a non-existent society described in considerable detail and normally located in time and space that the author intended a contemporaneous reader to view as considerably worse than the society in which the reader lived.

Utopian satire—a non-existent society described in considerable detail and normally located in space and time that the author intended a contemporaneous reader to view as a criticism of that contemporary society.

Anti-utopia—a non-existent society described in considerable detail and normally located in time and space that the author intended a contemporaneous reader to view as a criticism of utopianism or some particular eutopia.

Critical utopia—a non-existent society described in considerable detail and normally located in time and space that the author intended a contemporaneous reader to view as better than contemporary society but with difficult problems that the described society may or may not be able to solve and which takes a critical view of the utopian genre. (9)

Sargent's definitions help to elaborate the modes within which utopian writing can operate, delineating the different functions it might perform. In particular, Sargent's notion of critical utopia is important to later theorists such as Tom Moylan. It is also worth mentioning Karl Mannheim's distinction between ideology and utopia. For Mannheim, ideology preserves the status quo, while utopia transforms it. Pictures of ideal societies need not be utopian, according to Mannheim's definition, as they might be ideological in their effect.

In "The Imaginary Reconstitution of Society: Utopia as Method," Ruth Levitas argues for the important architectural functions that utopia performs. The imaginary reconstitution of society, IROS, is both an analytical and a political method, and it involves "the construction or constitution of society as it is, as it might be, as it might not be, and as it might be hoped for or feared." In doing so, it offers both "an *archeological* or analytical mode, and an *architectural* or constructive mode" (47). Levitas quotes from Miguel Abensour to explain her understanding of the educative function of utopia. For Abensour, utopia prompts two kinds of intellectual response:

> Our habitual values (the "commonsense" of bourgeois society) are thrown into disarray. And we enter Utopia's new-found space: *the education of desire*. This is not the same "a moral education" towards a given end: it is rather, to open a way to aspiration, to "teach desire to desire, to desire better, to desire more, and above all to desire in a different way" (quoted in Levitas 56)

On the one hand, utopias prompt a critical response to contemporary society. The status quo becomes estranged. On the other hand, utopias provide concrete alternatives. In this way, utopias re-educate our desires towards new ends and means. According to Levitas,

"The strength of IROS or the utopian method is precisely that it deals with the concrete instantiation of values, enabling a level of real exploration and judgment." "Without a certain element of closure," she argues, without "specificity, commitment, and literalism about what would actually be entailed in practice, serious criticism is impossible" (57). At the same time, Levitas argues, these alternatives should not be seen as static; they are a part of a process – a methodology of imagining concrete alternatives – which might then undergo further critique and refinement through this ongoing process.

There is an important American tradition of utopian thought. In the early years of the American industrial era, a host of utopian communities propagated around the country. Many of these 19th century utopian experiments fused a critique of capitalism with an embrace of Christianity -- we might think here of Quaker and Amish communities across New England, or of the Oneida Community in New York. George Ripley's "Brook Farm" community famously inspired Nathaniel Hawthorne's *The Blithedale Romance*. Thoreau's *Walden* ought also to be understood in this context. There is a fundamental tension at the heart of the American dream. Utopianism has always battled with capitalism, which has its own utopian logic, but which has its roots in imperialism.

Many utopian novels were published into the first part of the 20th century, some making a considerable impact on political discourse. Edward Bellamy's *Looking Backward* produced such a response, with readers forming Bellamy societies in support of the reforms promoted in the novel. Upton Sinclair's critique of industrialism in *The Jungle* was counterbalanced by his practical utopian experiment at Helicon Hall, which opened near Englewood, New Jersey in 1906 with twelve families. If *The Jungle* offers

Sinclair's apocalyptic vision of unchecked capitalism, Helicon Hall represented his reconstructive vision of society.[11] Charlotte Perkins Gilman published the feminist utopia *Herland* in 1915. We might also see in this history of utopian thought its coincidence with the history of climate change. The utopian experiments that offered alternatives to market capitalism at the dawn of the industrial era acquire a renewed relevance as we enter its twilight.

Utopia also has its share of critics. As a result of Stalinism and the Cold War, utopianism took on totalitarian connotations. We can see this shift in attitude reflected in dystopian novels like *Brave New World* and *1984*. In *The Open Society and Its Enemies* Karl Popper argues that utopianism is dangerous, and that utopia can only be imposed by force. Finally, after the fall of the Berlin Wall and the collapse of the Soviet Union, scholars such as Francis Fukuyama argued that utopianism faces charges not just of impracticality and coerciveness, but also of irrelevance. With the emergent hegemony of global capitalism, Fukuyama argued, we arrived at the end of history, where, in Margaret Thatcher's terms, there is no alternative.[12]

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[11] When Helicon Hall burned to the ground only four months after opening, Sinclair defended the experiment, saying, "I have lived in the future" (qtd in Jensen viii). After Helicon Hall was destroyed by fire, Sinclair wrote a utopian play – *The Millennium* – set in the year 2002. Fascinatingly, King Camp Gillette was also a utopian socialist. He published a book entitled *The Human Drift* (1894) that imagines all industry taken over by a publicly-owned company and the country powered by Niagara Falls. His last book *The People's Corporation* (1924) was written with Upton Sinclair.

[12] Kim Stanley Robinson argues of these criticisms, "There are a lot of problems in writing utopias, but they can be opportunities. The usual objections, that they must be boring, are often political attacks, or ignorant repeating of a line, or another way of saying, "No expository lumps please, it has to be about me." The political attacks would be interesting to parse. "Utopia would be boring because there would be no conflicts, history would stop, there would be no great art, no drama, no magnificence." This is always said by white people with a full belly. My feeling is that if they were hungry and sick and living in a cardboard shack they would be more willing to give utopia a try. And if we did achieve a just and sustainable world civilization, I'm confident there would still be enough drama, as I tried to show in *Pacific Edge*. There would still be love lost, there would still be death. That would be enough. The horribleness of unnecessary

In *Archaeologies of the Future*, Fredric Jameson argues that utopian thought acquires a renewed relevance in confronting the historical moment of late capitalism. Jameson argues that "the Utopian form itself is the answer to the universal ideological conviction that no alternative is possible, that there is no alternative to the system. Utopia thus now better expresses our relationship to a genuinely political future than any other current program of action." The formal flaw (so called) of utopia, its radical break from realpolitik, thus becomes its rhetorical and political strength: "it forces us precisely to concentrate on the break itself, on the unrealizable in its own right." Jameson argues against Fukuyama's declaration of "end of history," suggesting that "Utopia recovers its vocation at the very moment where the undesirability of change is everywhere dogmatically affirmed." (231)

In *The Task of Utopia,* Erin McKenna defends a pragmatic, feminist approach to utopianism, arguing convincingly that the charges of coerciveness and totalitarianism properly apply only to the end-state utopia. End-state utopias emphasize goals, taking an instrumental approach that might allow any means as permissible in order to achieve an overriding end goal. End-state utopias fail to creatively integrate means and ends in their quest for the better world. As a result, end-state utopias also face the charge of being static. They lack dynamism and drama. They fail to appreciate and encourage our continued participation in the formation of the future.

Adapting Sartre's slogan about being neither communist nor anti-communist, but instead anti-anti-communist, Jameson formulates the phrase anti-anti-utopianism to

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tragedy may be lessened and the people who like that kind of thing would have to deal with a reduction in their supply of drama." (Robinson, Interview, 93)

describe the formal experimentation of Cold War American SF writers like Philip Dick, Samuel Delaney, and Ursula LeGuin. In its playfulness with the forms and limits of utopian thought, the aim of anti-anti-utopian writing is to free the imagination from the present, rather than trying to offer inevitably impoverished pictures of what life in the future is going to be like. Jameson's anti-anti-utopianism, I would argue, offers a useful starting point for rethinking the character of utopia – playful and experimental, constantly cognizant of the pitfalls of its own endeavor. Erin McKenna formulates this problematic even more productively. Rather than taking the double-negative non-stance of anti-anti-utopianism, McKenna recommends a "process model of utopia," based on a feminist reading of Dewey's theorization of democracy, emphasizing experimentalism and the cultivation of flexible and critical habits of mind. Our adherence to capitalism comes from a lack of will-power and a failure of imagination. Utopia is the mode of thought most precisely calibrated for addressing our current political moment. What global warming makes clear is that we need an alternative to industrial capitalism as it has been conceived thus far.

CHAPTER III

THE END OF NATURE

The scientific narrative of climate change acquired an important level of international consensus in the late 1970s and early 1980s. In *The Discovery of Global Warming,* Spencer Weart explains that the World Climate Conference in Geneva in 1979 prompted the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU) to collaborate in establishing the World Climate Research Program (WCRP). At a 1985 conference in Villach, Austria, the assembled scientists issued a warning and a call to action: "in the first half of the next century a rise of global mean temperature could occur which is greater than any in man's history…. While some warming of climate now appears inevitable due to past actions, the rate and degree of future warming could be profoundly affected by governmental policies" (qtd. in Weart, 151).

In the popular imaginary of the United States, however, global warming remained largely below the radar until the summer of 1988. Newspaper coverage of climate change was limited, and the public was either unaware of the threat or saw climate change as a problem only for the distant future (Weart 154). Then several events brought climate change into broad public awareness. Most histories point to the summer of 1988 as a turning point, when North America suffered an extreme heat wave and James Hansen testimony before Congress that a long-term warming trend was underway and that the greenhouse effect was to blame. In *The Science and Politics of Global Climate*

Change (2006) Andrew Dessler and Edward Parson point out that "this extreme summer followed a period of intense worldwide publicity about the Antarctic ozone hole and the successful negotiation of the Montreal Protocol…to control the responsible chemicals…. [P]oliticians and the public were primed to consider the possibility that human activities could be disrupting the global climate" (12). The UN General Assembly passed a resolution declaring the climate a "concern to mankind" and established the International Panel on Climate Change (IPCC). News coverage increased, and later in 1988, instead of naming a "Person of the Year," *Time* magazine named the "Endangered Earth" the "Planet of the Year" (Dessler and Parson 12).

The following year, Bill McKibben published *The End of Nature* (1989), his landmark work on global warming. A staff writer for *The New Yorker* for much of the 1980s, *The End of Nature* was McKibben's first book, and it is regarded as the first book for a general audience about global climate change. "We just happen to be living at the moment when the carbon dioxide has increased to an intolerable level," writes McKibben. "We just happen to be alive at the moment when if nothing is done before we die the world's tropical rain forests will become a brown girdle around the planet that will last for millennia…. We just happen to be living in the decade when genetic engineering is acquiring a momentum that will soon be unstoppable" (194). Like Rachel Carson's *Silent Spring* (1962), *The End of Nature* was serialized in *The New Yorker* before it was published by Random House in 1989. And like *Silent Spring*, *The End of Nature* deploys apocalyptic rhetoric in order to convey a sense of urgency. McKibben warns against a dystopian future of global warming and genetic engineering at the same time as he offers an apocalyptic elegy for wilderness. "An idea, a relationship, can go

extinct, just like an animal or a plant," writes McKibben; "The idea in this case is 'nature,' the separate and wild province, the world apart from man to which he adapted, under whose rules he was born and died" (48). In the past, McKibben argues, we damaged parts of the environment. Now we were destroying the biosphere, fundamentally altering and diminishing the world in which we lived.

Entering the public sphere at the close of the Cold War, I argue that climate change took on distinctive resonances as it filled a void in the political imaginary left vacant by the collapse of the USSR. The end of the cold war marked the so-called victory of free-market capitalism. With the disappearance of the explicit critique of capitalism that the Soviet Union constituted, a question remained – from what perspective can one offer a critique of the dominant political-economic order? The answer, it seems, lay in the limits of the planet itself. In his article "Dystopia and the End of Politics," Benjamin Kunkel elaborates the connections between global warming and the fall of the Soviet Union:

> petroleum exports made up some 60 percent of the USSR's foreign currency earnings, and the same high oil prices that buoyed the Soviet rivalry with the United States encouraged conservation in the West. When, in the mid-eighties, oil prices collapsed, it not only helped finish off the USSR but increased fuel consumption outside the Soviet bloc, which in turn accelerated global warming, along with…the depletion of the earth's oil reserves" (89).

When the energy crisis of the 1970s gave way to cheap oil in the 1980s, it prompted the collapse of the Soviet economy at the same time as it created the illusion that capitalism no longer faced the resource challenges of the previous decades. Kunkel argues that

"many of our newer anxieties turn…on the idea that the oil intensive planetary transportation system so vital to the functioning of contemporary capitalism ultimately abets climate change, the arrival of peak oil, and the circulation of viruses, while globalized financial markets are capable of spreading contagions (as in the "Asian flu" of 1998) of a different kind" (89).[13]

In this same context, climate change took on the connotations of nuclear catastrophe. The 1980s represented the culmination of a nuclear arms race that had lasted almost half a century; the possibility of a nuclear catastrophe had been the predominant apocalyptic scenario for so long that it had carved deep impressions in the public imagination. Moreover, the resonance of nuclear apocalypse that continues to cling to climate change is more than just an echo. The shape of climate change rhetoric was determined in part by environmentalists and activists who organized around issues of nuclear weapons and waste and then adapted their messages and strategies to combat climate change. The Union of Concerned Scientists, for example, which had originally organized because of concerns about nuclear technology, made climate change an official priority in the 1980s. Climate change and nuclear catastrophe both represent apocalyptic critiques of human technology. The temporal scales on which the two scenarios operate, however, is vastly different. Nuclear catastrophe can happen in an instant; climate

[13] More recently, Slavoj Zizek argues that "The contours of a new Cold War are…appearing on the horizon—and, this time, it will be a conflict literally fought in very cold conditions. On August 2, 2007 a Russian team planted a titanium capsule with a Russian flag under the ice caps of the North Pole…. Its…goal was to secure for Russia the vast energy riches of the Arctic: according to current estimates, up to one quarter of the world's untapped oil and gas sources may lie under the Arctic Ocean. Russia's claims are, predictably, opposed by four other countries whose territory borders on the Arctic region: the United States, Canada, Norway, and Denmark (through its sovereignty over Greenland)." (*Living in the End Times* 328)

change happens slowly. Nuclear catastrophe is a critique of technological hubris and human aggression; climate change is a general critique of the industrial order.

During the 1990s the IPCC published its first two assessment reports, and at the 1992 Earth Summit in Rio de Janeiro more than 150 states signed the "United Nations Framework Convention on Climate Change." Dessler and Parson point out that during the Clinton administration (1993 – 2001), conservatives maintained a powerful influence in Congress, and despite Vice President Al Gore's commitment to climate issues, the administration was largely ineffective in its approach to global warming. In *From Apocalypse to Way of Life*, Fredrick Buell argues that the political Right resisted the scientific narrative of ecological crisis, opting instead for a combination of religious exceptionalism, nationalism, and technological optimism, while the critical edge of the Left went the way of postmodernism, fragmentation, and simulacra. The proliferation of media and communications technology overwhelmed the arena of discursive production and seemed totalizing. In this context, Buell argues, apocalyptic and utopian frames vied for dominance with one another; apocalypse predominated, but this chapter will illustrate ways in which we can also see the persistence, resurgence, and rearticulation of a dormant utopian aesthetic.

This chapter develops an analysis of three fictional representations of climate change -- T.C. Boyle's *A Friend of the Earth* (2000), Margaret Atwood's *Oryx and Crake* (2003) and *The Year of the Flood* (2009), and Octavia Butler's *Parable of the Sower* (1993) – each of which offers insight into the science and policy of climate change, as well as the changing shape of environmentalist rhetoric from the 1990s to the present. Set in the diminished environment of 2025, Boyle's novel emphasizes the common generic

ancestry of utopia and satire, conducting a critique of late 20th century American radical environmentalism and its shortcomings in the face of global climate change. Atwood's novels foreground concerns about biotechnology and corporatocracy in an extrapolation of what Naomi Klein terms "disaster capitalism." *Oryx and Crake* interrogates the social consequences of the polarization between the sciences and humanities identified by Snow, while *The Year of the Flood* offers a vision of radicalism founded in food. Finally, in Butler's novel, climate-induced stresses on ecological services and the privatization of the commons collude to prompt the deterioration of civil society. Like Atwood's novels to this extent, Butler goes farther in presenting a class, race, and gender conscious critique of climate change. The most utopian of the texts under consideration, Butler's *Parable* juxtaposes this narrative of decline with a counter-narrative of sustainable community coming together across divisions that often hinder cooperation, arguing for the hope of emancipatory agency even within a dystopian world. What justifies this constellation of texts is that they all offer commentary on the decade of the 1990s. They are, in an important sense, pre-9/11 texts, although Atwood's novels blur that boundary. All three authors are concerned with the lived experience of a changed climate—the phenomenology of climate change. In contrast to the novels in the next chapter, which focus on the changing climate itself, these novels imagine a future on the other side of climate change. They do not require any specific trigger mechanism to make their futures plausible. The change has already happened. To that extent, they are fatalistic. They might optimistically be read as warnings—possible futures to avoid. Pessimistically, they might be understood as a kind of futuristic critical realism.

T.C. Boyle is not often thought of as a science fiction writer, but *A Friend of the Earth* is a clear example of speculative futurism, and the degree of scientific literacy within the novel argues for its inclusion as science fiction. Boyle has received number of literary awards, including the PEN/Faulkner Award, the PEN/Malamud Prize, the PEN/West Literary Prize, the Commonwealth Gold Medal for Literature, the National Academy of Arts and Letters Award for Prose Excellence.

Set in 2025, *A Friend of the Earth* offers satirical commentary on American radical environmentalism of the late 20th century. Boyle imagines a biosphere altered by global warming – one in which massive species extinction has occurred and a resistant strain of the deadly *mucosa* virus has proliferated around the globe. The weather pattern in southern California alternates between extreme drought and flash floods, and in this diminished landscape, the novel's protagonist, Tyrone O'Shaughnessy Tierwater – a former eco-activist in the radical group Earth Forever! -- now manages a menagerie of animals "only a mother could love," owned by super-rich pop-star, Maclovio Pulchris. The plot develops when Andrea, Tierwater's former lover and step-mother to his daughter Sierra, contacts him after twenty years. She convinces Tierwater to allow another Earth Forever! member, April Wind, to interview him for a biography of Sierra. Through this device, the reader learns about Tierwater's involvement in the radical environmental movement of the late 1980s and 90s. As the weather gets worse in the future, the animals must be moved from their cages and into the Pulchris mansion, where they wreak havoc. As the plot resolves, Ty and Andrea drive north to an old Earth Forever! cabin in the Sierra Nevada mountains to begin their young-old lives anew – achieving a version of the middle-class American dream. The novel ends on a note of

ironic optimism, limned by the dystopian vision with which it is self-consciously complicit. Throughout the novel, Boyle conducts a humorous, critique of late 20th century American radical environmentalism and its shortcomings in the face of global climate change.

Boyle's novel displays a self-conscious engagement with several discourses within American environmentalism. Through allusion, Boyle's protagonist / narrator locates himself in a literary environmental tradition that includes Thoreau, Muir, Rachel Carson, and especially Edward Abbey. Set in a diminished ecosystem that makes these authors seem nostalgic rather than visionary, Boyle also sets his novel at a critical distance from this literary tradition. As Tierwater remarks early in the novel, "I'm an environmentalist, after all—or used to be; not much sense in using that term now" (Boyle 8). *A Friend of the Earth* injects postmodern irony and self-reflexivity into this environmental tradition, using humor to critique a genre already filled with satire – Boyle's novel self-consciously twists the humor of Edward Abbey and the letters and articles published in Earth First! pamphlets. At the same time, Boyle's novel also displays a sophisticated continuity with scientific discourses about climate change, species extinction, and wilderness conservation.

Through irony, Boyle's novel also engages the utopian tradition in American environmentalism. In *The Shape of Utopia* (1970) Robert Elliott argues for the common origins of utopia and satire. Elliott writes,

> utopia is the secularization of the myth of the Golden Age, a myth incarnated in the festival of Saturnalia. Satire is the secular form of ritual mockery, ridicule, invective—ritual gestures which are integrally part of the same festival. Thus

> utopia and satire are linked in the celebration of Saturn, a god who reigns over the earthly paradise, but who also by reason of his concern with melancholy, disease, and death becomes the patron of snarling Renaissance satirists. The two modes are formally joined in More's eponymous work, and indeed the very notion of utopia necessarily entails a negative appraisal of present conditions. Satire and utopia are not really separable, the one a critique of the real world in the name of something better, the other a hopeful construct of a world that might be. The hope feeds the criticism, the criticism the hope. Writers of utopia have always known this: the one unanswerable argument for the utopian vision is a hard satirical look at the way things are today. (24)

Elliott's comments help us to understand the ways in which Boyle's novel operates as utopia. The future that Boyle constructs in *A Friend of the Earth* derives not only from scientific reports on climate change and species extinction, but also from a satirical extrapolation of deep ecology fantasies that imagine dramatic decreases in future human populations. What seems on the surface to be a dystopia becomes, on closer inspection, an ironic utopia. The catastrophe that plays out in the story is, in fact, one that some of the characters might have wished for.

Through irony, then, Boyle's novel offers a productive consideration of the practical challenges and the ideological problematics of species preservation in the face of climate change. In the "Prologue," Tierwater describes himself as "an animal man" who manages Maclovio Pulchris' private menagerie, "the last surviving one in this part of the world, and it's an important—scratch that, vital—reservoir for zoo-cloning and the distribution of what's left of the major mammalian species" (2). Tierwater's stream of

consciousness editing -- "scratch that, vital" -- highlights rhetoric, and highlights his doubts about the continued significance of his own place within a fundamentally changed system. To conduct this satire, Boyle simply points to an already-occurring consequence of climate change. The possibility of massive species extinction within the next century is a distinct threat. In *Red Sky at Morning* (2004), James Gustave Speth writes that "few Americans appreciate how close at hand is the widespread loss of the American landscape. The best current estimate is that…climate change projected for late this century will make it impossible for about half the American land to sustain the types of plants and animals now on that land" (16). While Speth focuses here on the U.S. because of its leading role in carbon emissions, the problem of species extinction and biodiversity loss is global. As Stephen Meyer explains in *The End of the Wild* (2006),

> Over the next 100 years or so as many as half of the Earth's species, representing a quarter of the planet's genetic stock, will functionally if not completely disappear. The land and oceans will continue to teem with life, but it will be a peculiarly homogenized assemblage of organisms unnaturally selected for their compatibility with one fundamental force: us. (4)

Boyle's novel, set in 2025, might exaggerate the speed of species extinction, but he does not overstate the threat. In abrupt climate change scenarios, massive species extinction within a time frame such as that imagined by Boyle is not impossible, and even in the longer context of gradual climate change scenarios, massive species extinction on the order of that described in the novel is virtually assured within a century – "and in this sense, the extinction crisis—the race to save the composition, structure, and organization of biodiversity as it exists today—is over, and we have lost" (Meyer 5).

A Friend of the Earth does not oversimplify this threat. As Meyer reminds us, loss of biodiversity does not mean life will cease to exist. Describing his quarters at the Pulchris estate, Tierwater remarks,

> The place smells of mold—what else?—and rats. The rats—an R-selected species, big litters, highly mobile, selected for any environment—are thriving, multiplying like there's no tomorrow (but of course there is, as everybody alive now knows all too well and ruefully, and tomorrow is coming for the rats too). (Boyle 8)

Through the device of Tierwater's knowledge as an "animal man," Boyle interprets the salient aspects of his biologically diminished landscape for the reader. Meyer explains, "at one extreme, we are making the planet especially hospitable for the *weedy species*: plants, animals, and other organisms that thrive in continually disturbed, human-dominated environments" (Meyer 9). At the other extreme, of course, humans are making the planet extremely inhospitable for species adapted to disappearing ecological niches. Through our capacity to alter the world around us, humans are, Meyer asserts, creating a three tiered hierarchy of life—a world comprised of "weedy" species, "relic" species (those species that will continue to exist only through benign neglect or, increasingly, through active management), and "ghost" species (for whom extinction is guaranteed). One proposal for preserving endangered species, with which *A Friend of the Earth* is most explicitly engaged, includes genetic engineering, but as Meyer explains, "this kind of *Jurassic Park* thinking ignores the fact that all of the factors that contributed to species loss in the wild will remain in place and probably be even more powerful" in the future. "At best," he argues, reengineered species "could exist as genetic relics in a

zoo" (61). Boyle's novel imagines a world in which the technology does not yet exist to attempt a large-scale genetic re-engineering project. The species surviving in Pulchris' menagerie already occupy the absurd space of zoo-bound genetic relics. *A Friend of the Earth* represents Tierwater's attempt to come to grips with the fact that, "nature doesn't matter anymore—it's not even nature, just something we created out of a witch's brew of fossil fuel emissions and deforestation" (Boyle 103).

In the face of widespread and inevitable species extinction, Meyer argues, conservationists and environmentalists need to dramatically re-imagine their values and their strategies:

> we must abandon our humanist love affair with the wild, purging considerations such as landscape aesthetics and romanticist isolation, and instead applying the cold light of necropsy to dissect the collapsing processes of natural selection. (Meyer 78)

T.C. Boyle's *A Friend of the Earth* attempts precisely this purging of Romantic and aesthetic considerations in formulating the human relationship to the non-human natural world. And, significantly, Boyle sets the "earliest" scene of his novel in 1989, the same year as Edward Abbey's death and Bill McKibben's publication of *The End of Nature*. In *The End of Nature,* McKibben argues that,

> without realizing it we have already stepped over the threshold of such a change that we are at the end of nature.
>
> By the end of nature I do not mean the end of the world. The rain will still fall and the sun shine, though differently than before. When I say 'nature' I mean a certain set of ideas about the world and our place in it. But the death of those

> ideas begins with concrete changes in the reality around us—changes that scientists can measure and enumerate. More and more frequently, these changes will clash with our perceptions, until, finally, our sense of nature as eternal and separate is washed away and we will see all too clearly what we have done. (8)

McKibben's argument provides the context for reconsidering Boyle's satire in terms of a kind of realism – Boyle's future imagines the world as it is, factoring in the environmental debt that we have already accumulated. The seeming difference between 1989 and 2025 only serves to highlight their figurative temporal simultaneity.

Sylvia Mayer rightly points to Tierwater's encounters with the abject as an important space in which this purgation / reformulation takes place. Drawing upon Kristeva's understanding of the abject as an encounter through which subject formation takes place, Mayer argues that in an ecological dystopia, the "body is exposed to dirt, wetness, stink, and prolonged phases of darkness. There is hardly any relief for the senses. The permeating quality of these experiences challenges the boundaries between body and outside world and asks for their redrawing" (Mayer 224). Tierwater's strategy of dealing with these encounters through irony and sarcasm, she argues, demonstrates that "Boyle's protagonist has not yet been able to accommodate these changes, that he is preoccupied with integrating them into a new notion of self" (224). In the future that Boyle imagines, "both body and mind have to adapt to this loss of received temporal patterns and spatial refuge. The collapse of the biosphere calls for new anthropological conceptualizations and for a new conceptualization of the relation between nature and culture" (Mayer 224-225). Tierwater's sarcasm in the face of the abject (and Boyle's humor) arises from a tension between his nostalgia for the past and its discontinuity with the present.

Tierwater's personal struggle to integrate his sensory experience of an altered ecosystem with his identity as "a friend of the earth" thus serves as a synecdoche for American environmentalism's struggle to redefine itself in the face of global climate change.

Sylvia Mayer further argues that *A Friend of the Earth* performs a feminist critique of radical environmentalism by demonstrating they ways in which Ty's "identity as an environmentalist was formed in confrontation with a model of masculinity that Andrew Ross has called the concept of the 'ecological superman'" (228). As Mayer explains, Ross's notion of the ecological superman is just one more manifestation of the American ideal of the "self-made man," (with its attendant valorization of white, heterosexual masculinity), in this case "characterized by its appropriation of the moral power of environmentalism" (229). Mayer is surely correct, but I would argue that Boyle's critique of radical environmentalism is even more comprehensive and intentionally situated within the history of radical environmentalist discourse than Mayer gives him credit for. Through parody, Boyle's novel rehearses a social ecology critique of deep ecology. Describing the tenets of his environmentalism in the "Prologue," Tierwater explains "I believe in Live and Let Live, Adat, Deep Ecology, No Compromise in Defense of Mother Earth" (Boyle 8). Tierwater later reflects ironically on the character of his deep ecology:

> Friendship. That's what got me into the movement and that's what pushed me way out there on the naked edge of nothing, beyond sense or reason, or even hope. Friendship for the earth. For the trees and shrubs and the native grasses and the antelope on the plain and the kangaroo rats in the desert and everything else that lives and breathes under the sun.

> Except people, that is. Because to be a friend of the earth, you have to be an enemy of the people. (55-56)

Tierwater's assertion of this strict dichotomy between concern for the non-human environment and concern for humans and issues of social justice alludes to a famous disagreement between social ecologist Murray Bookchin and several members of Earth First! in the late 1980s, in which Bookchin accused Earth First!, and by extension, deep ecology, of promoting neo-Malthusianism and eco-fascism.

For Bookchin, Malthusian approaches to environmentalism fail to account for the primarily social nature of environmental problems. Furthermore, they justify reactionary nativism more often than they produce positive change. Building upon Bookchin's critique, in *Environmental Ethics for a Postcolonial World* (2005), Deane Curtin demonstrates that a Malthusian approach to environmental concerns results in forms of violence at the level of policy-making: "Malthusian policies, pessimistic as they are about the ability of people to control themselves and plan rationally for the future, target the control of women as the main solution to population pressures. Thus we have had many coercive approaches to population control" (Curtin 4). And as Greg Garrard argues in *Ecocriticism*, "Neo-Malthusianism has been used to justify stronger immigration controls in rich countries and to protect their threatened carrying capacity, as well as ending food aid to famine-struck countries that have allegedly overshot their ecological limits. In both cases, biological models are applied to human situations with results that directly corroborate an extreme right wing politics even when they do not derive from them" (Garrard 97).

Bookchin's article, "Social Ecology Versus Deep Ecology" was written in direct response to Christopher Manes, who, under the pseudonym "Miss Ann Thropy," published an article in *Earth First!* entitled "Overpopulation and AIDS," arguing that the AIDS crisis was a natural and proper response to overpopulation. Bookchin's article is also directly critical of David Foreman, who in an interview with Bill Devall, suggested a similar, natural logic to famine in Ethiopia (Bookchin 220). Boyle's repeated references to the *mucosa* virus make the Malthusian tendencies of his characters explicit. Explaining her reasons for returning to the Pulchris mansion with Ty, Andrea explains, "Maclovio Pulchris. We need him. His money, anyway. Earth Forever! is going to fly again, in a big way. If this new *mucosa* strain is what we think it is, then the crash we've been talking about all these years is here, here right now" (Boyle 92). And later in the story, after the animals have been moved inside because of flooding, Maclovio Pulchris' neighbor comes to the door seeking shelter:

> 'Mr. Pulchris,' Delbert Sakapathian says, addressing Mac with all the awe and humility of a communicant in the church of celebrity, 'we need help. I—this is Old Man Foley, from the Lupine Hill Retirement Home?—and there's nothing left over but wreckage, and he needs shelter, I mean, if you can spare it, just till they can get the emergency crews in there to rebuild or take people to a gymnasium somewhere or something. He's been wet through to the skin for days now.'…
>
> Finally, Mac, in his sweetest voice, says no. Shakes his head wearily, the eel whips slipping across the slick surface of his restored shades. 'I'd like to help,' he says, 'I really would, but I just can't—we can't—risk it. It's the

mucosa. You understand, don't you? I want to help. I do. Money's no problem. You want money? (Boyle 191)

Pulchris' failure to offer shelter to his neighbor in a time of need demonstrates the limits of his environmentalism. A friend of the earth, Mac is no friend of people. In a time of need he can offer only charity, but not cooperation. Mac's refusal to help his neighbor thematizes radical environmentalism's failure to meet the ethical demands of social justice.

Finally, as a parody of Earth First!, Boyle's depiction of Earth Forever! also documents the private funding and upper-class origins of radical environmentalism as it developed during the 1990s. Through narrative refraction, Boyle exposes EF! as a bourgeois radicalism: "This time the car was a smooth black BMW—one of the pricey models, 740i, Andrea's car, and who'd bought it for her? 'You did, Ty, and I love you for it. We needed something with a little class for pulling up at the curb when they've got the cameras going, you know?'" (Boyle 319).

Boyle's novel produces a useful critique of late 20th century radical environmentalism, but falls short of inspiring a hopeful vision of the future. His satire relies on a kind of defeatism with regard to climate change that offers no alternative to the deep ecology and radical environmentalism that it critiques. Its scorn is reserved for activists instead of legislators, and to this extent Boyle refrains from a more productive political critique. But perhaps this is Boyle's point – direct action radical environmentalism never achieves a productive political critique. Boyle's negative critique hints at the positive vision of social ecology, but fails to imaginatively realize such a vision within his novel.

More explicitly than her other novels, Margaret Atwood's *Oryx and Crake* (2003) and *The Year of the Flood* (2009) are books about radicalism and resistance in the Americas. *The Year of the Flood* returns to the dystopian future of *Oryx and Crake*, expanding the scope of that earlier novel. A "simultanequel," narrated from multiple points of view, *The Year of the Flood* builds upon the story of *Oryx and Crake*, offering a more thorough set of critical perspectives on capitalism and collapse. Taken together, these two novels constitute a "critical dystopia," insofar as they operate, in Tom Moylan's terms, "inside the ambient zone of anti-utopian pessimism with new textual tricks," exposing the "horror of the present moment" (Moylan 196).

Entering this ambient zone of anti-utopian pessimism, Atwood knows that she is writing in a genre with a long history, and the dystopian world of these two novels reads something like a tribute album, with explicit allusions to Orwell and Huxley, as well as references to *Soylent Green* (1973) and *Dr. Strangelove* (1964). Atwood also draws heavily upon the Bible and Blake, and her more canonical literary allusions argue for the inclusion of speculative fiction alongside the ranks of high literature, if that argument still needs to be made. Finally, Atwood's own interest in dystopia is longstanding; although she won the Booker in 2000 for *The Blind Assassin*, she is perhaps more famous for her 1985 novel *The Handmaid's Tale*. Though they arguably participate in the same genre, *Oryx and Crake* and *The Year of the Flood* offer something different than *The Handmaid's Tale* – they present a broader socioeconomic and technological critique of contemporary society.

Atwood's novels are world-historical in their scope, but American in their focus. She imagines a future in which corporations have privatized the last vestiges of the public

sphere, strangling and then replacing the government as it withers away. It is a dystopia extrapolated from Naomi Klein's description of disaster capitalism in *The Shock Doctrine* (2007). As a form of sociological thought-experiment, *Oryx and Crake* and *The Year of the Flood* amplify certain characteristics of contemporary society in order to achieve the descriptive insights such manipulation produces -- Atwood writes in her acknowledgements that "*The Year of the Flood* is fiction, but the general tendencies and many of the details in it are alarmingly close to fact." In this sense her novels operate as a form of scenario-thinking and as an important warning. Atwood warns against bioterrorism, internet terrorism, and corrupt corporate security agencies. Indeed, her novels tackle such relevant and timely scenarios that judge Richard Posner has weighed in with his opinion on the risk of a bioterrorist catastrophe like the one she describes.[14] Through the landscape she constructs, Atwood also offers prescient commentary on consumer desire, corporate advertising, food production, income disparity, health care, education, and climate change.

According to Moylan, critical dystopias "adopt a militant stance that is informed and empowered by a utopian horizon that appears in the text—or at least shimmers just beyond its pages" (Moylan 196). In *The Year of the Flood*, this utopian horizon moves to center stage in the form of the "God's Gardeners" intentional community. The Gardeners represent a form of radical resistance, and through their praxis, they offer a vision of change. Atwood's portrayal of radicalism in *The Year of the Flood* is decidedly agrarian; radicalism in this novel is about roots, about growing resistance from the

[14] Richard Posner's *Catastrophe: Risk and Response* (2004) was inspired by a review of *Oryx and Crake* Posner wrote for *The New Republic*.

ground up – starting with the realm of necessity. For Atwood's Gardeners, radical change reconstructs our engagement with the realm of necessity – food, water, clothing, shelter, sex – to produce a principled social order. Through her portrayal of the Gardeners, Atwood raises critical questions about the role of subsistence in resistance, about the importance of ritual and myth, and about the influence of gender and sexuality on the possibility for reconstructed human relationships.

Ostensibly a nonviolent community, the Gardeners rehearse for a post-apocalyptic world, and with good reason – it quickly becomes clear that they are working to bring about the prophesied "Waterless Flood" that will take down the dominant social order. *The Year of the Flood* illuminates the horizons of *Oryx and Crake*, and we see that two utopias hang together in these novels – one a eugenics project, the Crakers, and the other a behavioral engineering project, the Gardeners. What is insightful about *The Year of the Flood* is the way in which it reveals these two utopian visions to be in collusion with one another, both problematically class-bound and authoritarian, ultimately reliant upon a collapse that they must bring about themselves. With traditional forms of civic engagement rendered obsolete, resistance in Margaret Atwood's novels looks like a kind of biological eco-sabotage. In this sense, Atwood's novels should also be considered alongside Edward Abbey's *The Monkey Wrench Gang* (1975) and Neal Stephenson's *Zodiac* (1988). Indeed, Atwood's novel might aptly be described as "biopunk." And like *The Monkey Wrench Gang*, perhaps what is most valuable about *The Year of the Flood* as a resistance novel is that it is dialogic. Atwood's shifting point of view creates a comparative analysis as readers are exposed to a multiple forms of resistance in dialogue

with one another, from the non-violent lifestyle resistance of the Adam One and the Gardeners to the violent radicalism of Zeb and the MaddAddam group.

The utopian horizons within these two texts are so clear that Atwood's novels almost constitute a critical utopia, but Atwood's portrayal is so negative that they might as well be considered anti-utopias. In both novels, Atwood maintains a critical lens on the resistance by narrating the story from the perspectives of characters who join the resistance accidentally, rather than based upon ideological commitment. This critical lens is important; Atwood thereby points to some of the problems associated with agrarianism as a form of resistance to capitalism -- for example, the ways in which, to be financially viable, the Gardener's market enterprises depend upon a bourgeois consumer ethics. Moreover, through a limited third person perspective, Atwood also levels a critique at violence. Narrated primarily from female points of view, the more violent strains of resistance in these novels are overwhelmingly portrayed as adolescent and male. *The Year of the Flood* thus reads a bit like *Transcendental Wild Oats* (1873) meets *Fight Club* (1996). Atwood maintains an ironic distance from the resistance and its radicalism that allows for critique, but which also undermines the architectural functions her novels could perform. Her portrayal of the Gardeners lacks the sincerity necessary to envision a positive alternative useful to productive change.

More than anything else, Atwood's novels tap into an eschatological apocalypticism that is very much in vogue these days. It is disconcerting the extent to which we have internalized these narratives of catastrophe. We believe ourselves to have already destroyed the planet, to have severed our connection with the non-human world. Part of the problem with this version of apocalyptic rhetoric is the extent to which it

produces political apathy by blaming human nature for the problem. Human institutions are the problem, not human nature. Human nature gives rise to various forms of social institutions, each of which works to emphasize different aspects of human nature in different ways – in ways with meaningfully various political and ethical significances, in ways more or less harmonious with non-human nature. Atwood's novels expose the extent to which our visions of change are often reliant upon a narrative of catastrophe, at the same time as she indulges in voyeurism about disaster and wallows in anti-utopian pessimism. We have not given up so much that Atwood's dystopia need be our future.

If *A Friend of the Earth* demonstrates what's wrong with the myopia and elitism of late 20th century conservation policy and radical environmentalism, and if *Oryx and Crake* and *The Year of the Flood* emphasize the dangers of biotechnology and terrorism, Octavia Butler's *Parable of the Sower* goes some distance towards offering a more comprehensive picture of the social problems that are likely to be created by climate change, and likewise some distance towards offering a useful vision of what a solution might look like—there is within Octavia Butler's novel a more sincere eutopian, communitarian impulse that forms a liberatory response to crisis.

Set in California during the 2020s, Octavia Butler's *Parable of the Sower* (1993) imagines a post-climate change world from a class and race conscious perspective. In Butler's novel, ecological problems play a secondary role to the deterioration of civil society that they prompt. The novel is structured as a series of journal entries by the protagonist, Lauren Olamina, a woman with a condition Butler describes as "hyperempathy" – the ability to actually feel the physical sensations of pain and pleasure experienced by those around her. Growing up in a walled suburban enclave outside of

Los Angeles, Lauren develops her own religion, which she calls "Earthseed," based upon the central tenet that "God is change." When vandals and thieves breach the walls of her community, destroying homes and murdering families, Lauren and two others are the only survivors. They travel north along the coast from Los Angeles toward Oregon, where water is rumored to be plentiful and where workers are still paid with cash instead of company script. Along the way, Lauren's group accumulates new members, whose stories offer insight into the social effects of climate change on characters from a broad spectrum of economic and cultural backgrounds. They must work together to survive, and as the plot resolves, they choose to settle on land in northern California, where they establish an intentional community based upon Lauren's "Earthseed" religion. Butler's novel offers a class, race, and gender conscious critique of possible post-collapse social orders, juxtaposed with a eutopian counter-narrative of sustainable community coming together across ethnic, economic, and gender boundaries that often hinder cooperation.

Parable of the Sower marks an important expansion of the traditional canon of literary environmentalism, presenting an account of life in an anthropogenically altered ecosystem that exhibits literary continuity with discourses of African-American slave narratives and stories such as Fredrick Douglass' *Heroic Slave* (1852). *Parable of the Sower* offers a perspective on climate change that foregrounds issues of social justice rather than wilderness preservation. Furthermore, Butler's novel displays a sophisticated continuity with scholarship on climate change from both the natural and the social sciences. As Frederick Buell argues, "Butler's fiction lays bare the increasingly deterministic, systemic interplay between social marginalization, poverty, social breakdown, and environmental crisis" (Buell 314).

In *Parable of the Sower* Butler documents the years 2024 – 2027 through the narrative frame of Lauren Oya Olamina's journal entries. Set primarily in southern California, Butler imagines a future in which governments at all levels have lost the ability to maintain order, protect human rights, and provide basic public services. Global warming and resource scarcity have led to ecological and social deterioration -- desertification and downpours in southern California, hurricanes, blizzards and tornadoes in other parts of the country. Early in the novel, Lauren writes:

> There's a big, early-season storm blowing itself out in the Gulf of Mexico. There are over 700 known dead so far. One hurricane. And how many people has it hurt? How many are going to starve later because of destroyed crops? That's nature. Is it God? Most of the dead are street poor who have nowhere to go and who don't hear the warnings until it's too late for their feet to take them to safety. Where's safety for them anyway? Is it a sin against God to be poor?... I wonder if people on the Gulf Coast still have faith. People have had faith through horrible disasters before. I read a lot about that kind of thing. I read a lot period. My favorite book of the Bible is Job. I think it says more about my father's God in particular and gods in general than anything else I've ever read. (Butler 13)

The full extent of Butler's prescience in this passage has become clear only in the years after Hurricane Katrina. Hurricane Katrina demonstrated clearly the character of environmental injustice in the event of natural catastrophe. In a later passage, Lauren explains to her friend Joanne:

> "There's cholera spreading in southern Mississippi and Louisiana," I said. "I heard about it on the radio yesterday. There are too many poor people—

> illiterate, jobless, homeless, without decent sanitation or clean water. They have plenty of water down there, but a lot of it is polluted. And you know that drug that makes people want to set fires?"
>
> She nodded, chewing.
>
> "It's spreading again. It was on the east coast. Now it's in Chicago. The reports say that it makes watching a fire better than sex. I don't know whether the reporters are condemning it or advertising it." I drew a deep breath. "Tornadoes are smashing hell out of Alabama, Kentucky, Tennessee, and two or three other states. Three hundred people dead so far. And there's a blizzard freezing in the northern midwest, killing even more people. In New York and New Jersey, a measles epidemic is killing people. Measles!" (Butler 47)

Butler's predictions match those of the International Panel on Climate Change, who, in their Fourth Assessment Report, warn that "poor communities can be especially vulnerable" to the impacts of climate change, as "they tend to have more limited adaptive capacities, and are more dependent on climate sensitive resources such as local water and food supplies" (12). Natural catastrophes, increased malnutrition and the altered spatial distribution of disease vectors are likely to adversely affect the health status of millions of people, "particularly those with low adaptive capacity" (IPCC 12).

Like Atwood, Butler projects a climate change future that represents the logical outcome of what Naomi Klein describes as *disaster capitalism*: "orchestrated raids on the public sphere in the wake of catastrophic events, combined with the treatment of disasters as exciting market opportunities" (Klein 6). In Butler's dystopia, resources have been

depleted and privatized, and in the absence of functioning municipal governments, whole towns have ceded their authority to private companies. Lauren describes,

> Something new is beginning—or perhaps something old and nasty is reviving. A company called Kagimoto, Stamm, Frampton, and Company—KSF—has taken over the running of a small coastal city called Olivar.… After many promises, much haggling, suspicion, fear, hope, and legal wrangling, the voters and officials of Olivar permitted their town to be taken over, bought out, privatized. KSF will expand the desalination plant to vast size. That plant will be the first of many. The company intends to dominate farming and the selling of water and solar and wind energy over much of the southwest—where for pennies it's already bought vast tracts of fertile, waterless land. So far, Olivar is one of the smaller, coastal holdings, but with Olivar, it gets an eager, educated work force, people a few years older than I am whose options are very limited. Not as limited as ours, of course, but limited. And there's all that formerly public land that they now control. They mean to own great water, power, and agricultural industries in an area that most people have given up on. They have long-term plans, and the people of Olivar have decided to become a part of them—to accept smaller salaries than their socio-economic group is used to in exchange for security, a guaranteed food supply, and help in their battle with the Pacific. (Butler 104-106)

Along these lines, Frederick Buell contrasts Butler's fiction with other forms of speculative fiction, notably cyberpunk, which, according to his formulation, represents a libertarian, classically capitalist, strain of science fiction: "The novel…deflates cyberculture's enthusiasm for headlong technological change, libertarian chaos, and

social Darwinism. Butler's depiction of the future argues that the real outcome of such a system is very different from what its proponents claim—it results not in a dynamic new era of capitalism and technology, but in synergistic increases in environmental deterioration and social injustice and disparity that put still further stress on both social and environmental systems" (Buell 315). In a moment of meta-textual self-reflexivity, Lauren comments,

> Maybe Olivar is the future—one face of it. Cities controlled by big companies are old hat in science fiction. My grandmother left a whole bookcase of old science fiction novels. The company city subgenre always seemed to star a hero who outsmarted, overthrew, or escaped "the company." I've never seen one where the hero fought like hell to get taken in and underpaid by the company. In real life, that's the way it will be. That's the way it is. (Butler 110)

Butler uses *Parable of the Sower* to reflect critically upon science fiction and to engage the potential of science fiction as a genre to produce a meaningful social and environmentalist critique.

Finally, Lauren's story offers two related modes of adaptation / resistance to the prevailing ecological and social dystopia of Butler's novel: religion and community. Within the walled community of Robledo, it is Lauren's father, a southern Baptist minister, who knits the community together through religion by providing a venue for public gatherings in the space of the church and a message of hope, determination, and cooperation with his weekly sermons. While still living in Robledo, Lauren begins to develop her own religion, based upon the central tenet that "God is change." Lauren explains:

> God can't be resisted or stopped, but can be shaped and focused. This means God is not to be prayed to. Prayers only help the person doing the praying, and then, only if they strengthen and focus that person's resolve. If they're used that way, they can help us in our real relationship with God. They help us to shape God and to accept and work with the shapes that God imposes on us. God is power, and in the end, God prevails.
>
> But we can rig the game in our own favor if we understand that God exists to be shaped, and will be shaped, with or without our forethought, with or without our intent. (Butler 22)

Lauren's conception of God as change offers a non-teleological, eco-feminist critique of male patriarchal theology. Sylvia Mayer argues that Lauren ultimately rejects a Christian theology which, in her view, "obstructs any successful coping with social, political, and environmental problems—problems from which both humans, especially the poor and people of color, and nonhuman nature suffer" (Mayer 184).

When Robledo's community is destroyed, Lauren's new religion, Earthseed, provides a necessary foundation for fellowship and an inspiration for survival that sustains Lauren's group during the journey she and her companions undertake towards northern California. In their mobility, however, it should be noted that Butler's "protagonists share nothing with the fantasies of mobility (mobility through global cosmopolitanism, through cyborg enhancement and genetic shape-shifting, through immersion in cyberspace) that contemporary American postmodern global culture celebrates." Instead, Frederick Buell argues, "Butler's future emphasizes what those fantasies repress: the limits on and vulnerability of the unassisted human body and the

challenges of finding food and shelter, staying healthy, having children, tending the ill and dying, and building community in an ecologically deteriorated world—the challenges, in short, of embeddedness and embodiment in a time of environmental crisis" (Buell 314). Ultimately, however, Jerry Phillips argues that "*Parable of the Sower* rejects fatalism in favor of emancipatory human agency. Butler would most likely agree with David Harvey that 'it is not change per se that has to be explained, but the forces that hold down change and/or give it a certain directionality. There is no single moment within the social process devoid of the capacity for transformative activity" (Phillips 307). The possibility of transformative activity in *Parable of the Sower* is achieved through the enactment of a communitarian ethos. As they travel northward, Lauren and the other protagonists repeatedly contrast their mode of survival with that of people in the "company towns," realizing that while company towns provide a measure of security, they demand the relinquishment of liberty. In the absence of a meaningful public sphere, and in the face of growing environmental and social crisis, this communitarian response offers perhaps the best model for grassroots politics and human agency.

Whereas Phillips describes Earthseed's settlement at Acorn as a "diminished utopia," Tom Moylan gives Butler more credit for her utopian vision. Moylan argues that

> Butler offers an overtly collective narrative of political development and creates an evident utopian horizon in her critical dystopian contribution…. Butler's willingness to explore the empowering force of a spiritually motivated but materially transcendent vision that is rooted in difficulty and difference allows her to posit a politicizing process that produces a vulnerable but viable utopian alternative. (Moylan 237)

According to Moylan, Lauren's Earthseed community "suggests a possible model for an oppositional movement that is fundamentally and insistently diverse yet strategically united, one able to generate a level of totalizing analysis and coordinated action that can challenge the entire socioeconomic system of the transnational corporations" (237).

In her 1976 introduction to *The Left Hand of Darkness*, Ursula LeGuin argues against a narrow understanding of science fiction as purely "extrapolative." According to this view, writers of science fiction take a phenomenon of the present, "purify and intensify it for dramatic effect," and project it into the future. Le Guin argues that extrapolation, while a useful device of the genre, is "far too rationalist and simplistic to satisfy the imaginative mind, whether the writer's or the reader's." LeGuin suggests instead understanding science fiction as a "thought experiment" in which "the moral complexity proper to the modern novel need not be sacrificed." She reminds us that the purpose of the thought experiment, as it was conceived of by Schrödinger and other physicists, was not to predict the future, but to describe the present. Science fiction then, properly understood, "is not predictive; it is descriptive."

LeGuin's argument for the realism of science fiction is helpful for framing a final reconsideration of the generic complexities of these novels. As Frederick Buell argues, *Parable* "reads more like a work of realistic, even naturalistic, fiction than like an extrapolative fantasy" (Buell 314). Written in 1993, Butler's novel comments as much upon the social upheaval in LA the previous year as it does the future. Sylvia Mayer explains that "by aiming at verisimilitude in its imaginative mapping of a plausible future, speculative fiction calls for critical reflection of the reader's present and past." In *Parable of the Sower*, Butler "uses realist conventions of representation to delineate the

features of her social and ecological dystopian future and by means of that facilitates reader identification" (Mayer 177).

Both Boyle and Atwood offer a critique of radical environmentalism, but Boyle's novel depicts radical environmentalism in a relatively benign light. And in this sense, *A Friend of the Earth* offers a distinctively pre-September 11 portrayal of radical environmentalism. Atwood's novels provide a transition between Boyle and Butler insofar as they offer a reflection on the ways in which radical environmentalism gets refigured as domestic terrorism in the wake of September 11.[15] Butler also offers a critique of radical environmentalism through a broader critique of naïve upper-class radicalism. In Octavia Butler's *Parables,* this upper-class radicalism is on the outside of the narrative, depicted with disdain. Butler's "Paints" are upper-class adolescents who take a drug called Pyro and want to destroy the system in a kind of Robin Hood movement. Instead of focusing her narrative on those characters, Butler focuses on a community brought together by necessity. From the perspective of the middle and lower classes, the vaguely socialist ideology of the Paints looks like terrorism instead of equality.

Both Butler and Atwood are concerned with issues of food sovereignty. The Gardeners constitute a resistance both similar and different from the Acorn community in Octavia Butler's *Parables.* The communities are similarly religious and ritualistic, but differently violent. Whereas Lauren's Earthseed community accepts the necessity for violence in self-defense, they do not advocate violence as a form of resistance, nor do

[15] Atwood began Oryx and Crake before 9/11, and then put it on hold and changed the shape of the narrative in response to that event.

they commit it on the kind of systematic scale that the Gardeners do. And yet while the Gardener's do not explicitly advocate violence, they are nonetheless covertly complicit with it. Part of what emerges after the collapse in Atwood's novel is just how difficult it is to live by the Gardener's precepts in a chaotic world. The first thing that Toby does in the novel is to go and get a gun that her father buried before the Corporations outlawed fire-arms. What is so powerful about these stories is that they return us to the fundamental political question – how do we organize? At the same time, they tend to indulge in a kind of voyeurism into the "state of nature" where life is nasty, brutish, and short. Therein lies the danger of apocalyptic rhetoric; it is this spectacle of violence and disorder that can compel the acceptance of forms of tyranny.

CHAPTER IV

IMAGINING ABRUPT CLIMATE CHANGE

> Only a crisis—actual or perceived—produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around.
>
> --Milton Freedman, *Capitalism and Freedom*

Within months of taking office on January 20, 2001, President George W. Bush made his contrarian stance on global warming clear. In a gesture symbolically akin to Regan's removal of the solar panels that Carter installed on the White House, Bush promptly pulled the United States out of the Kyoto Protocol, doing his part to dismantle the first substantive international agreement to limit greenhouse gas emissions. Justifying this decision, the Bush administration argued that scientific uncertainty about climate change was too great and that the Protocol's emissions limits would harm the US economy. When George W. Bush rejected the agreement in March of 2001, he made the United States the only industrialized country of its size to refuse participation altogether. Dessler and Parson argue that as the leader of the world's most flagrant carbon emitting country, Bush's rejection of the work done at Kyoto effectively stalled progress toward an international governmental solution to climate change. As a result of the United States' recalcitrance on climate policy, the legal fate of the Protocol, even for those countries who agreed to its terms, remained unresolved until late 2004, the final year in

which it could be ratified.[16] It would not be until November of 2004 that Russia, whose intentions had wavered in recent years, submitted its ratification, finally allowing the Protocol to enter into force in February of 2005, even without U.S. participation (Dessler and Parson 15-16). For the first time in the era of the nation-state, 141 countries agreed that anthropogenic climate change posed a serious challenge to the future of humanity's tenure on the planet. Led by Western Europe, these nations pledged to enact a variety of measures to restrict greenhouse gas emissions to 1990 rates by 2010.

November of 2004 also determined important elections in the United States, with both the Presidency and important legislative seats in the balance at the polls. In the context of this charged national and international political climate, a number of narratives of climate change were constructed and contested. This chapter analyzes three fictional representations of climate change published or released in the Kyoto landmark year of 2004: Roland Emmerich's film *The Day After Tomorrow*, Michael Crichton's *State of Fear*, and Kim Stanley Robinson's *Forty Signs of Rain*, the first novel in his Science and the Capital trilogy. Of the three texts, Robinson's novel was published first, in January, though only with limited release in Britain until June, when it gained circulation in the United States. *The Day After Tomorrow* opened in movie theaters on May 28, just before Robinson's novel reached American bookstores. Crichton's novel came last, arriving on bookshelves in early December, after the elections and just in time for the holidays. These three texts engage in an ideological debate whose terms have persisted in

[16] In order to enter into force, the treaty required ratification by 55 countries, including nations that contributed at least 55 percent of industrialized-country emissions in the baseline year (1990). Without the participation of the United States, the Protocol would only enter into force if every other major industrialized country, including Russia, ratified the Protocol (Dessler and Parson 16).

mainstream cultural consciousness, sustained through DVD sales and rentals for Emmerich's film, through lectures and congressional hearings featuring Crichton, and in the publication of Robinson's next two novels in 2005 and 2007.

Both *The Day After Tomorrow* and *Forty Signs of Rain* intend explicitly to do environmental advocacy work, depicting abrupt climate change scenarios brought about by a stall in the mid-Atlantic current. Emmerich's film, a summer blockbuster, exaggerates the possible effects of such an occurrence, depicting with computer generated special-effects a global super-storm that plunges the northern hemisphere into an ice age in a matter of days. *The Day After Tomorrow* foregrounds spectacle over science, mapping the rhetoric of catastrophe onto climate change. Crichton's novel also deals with abrupt climate change, but in contrast to the other two texts, *State of Fear* operates as a rebuttal and palliative, suggesting that global warming is unproven theory and overstated threat, describing an elaborate plot by eco-terrorists, in collusion with the media, to generate catastrophic weather events in order to raise money and exploit misguided government grants. Crichton adorns his narrative with the formal trappings of scientific scholarship, including charts, footnotes, and an annotated bibliography. *State of Fear* self-consciously presents science fiction as science fact and vice-versa, intentionally highlighting the rhetorical and narrative elements of global warming discourse. Finally, Kim Stanley Robinson's *Forty Signs of Rain*, set in Washington D.C. with the NSF as its hero, imagines an abrupt climate change scenario and the policy measures that would be required to adapt successfully. Described by one reviewer as "the first part of *The Day After Tomorrow*, but with good science and a more realistic time frame," Robinson's novel offers a nuanced engagement with the science of climate

change and thoughtful considerations of its social consequences. In a character-driven plot that includes scientists, politicians, Buddhist monks, homeless veterans, children and animals, Robinson's trilogy dramatizes a productive relationship between science and policy-making while raising important questions of intergenerational ethics, ecological economics, social justice, and sustainable cultural values. Of the three science-fictional narratives under consideration, Robinson's text offers the most useful touchstone for reimagining environmental politics in light of climate change.

The relationship of climate change to literature and film is important and necessarily understood in interrelation. The issue of representation is particularly complex with regard to climate change. There are several difficulties inherent in the project of representing climate change. As noted earlier, climate change exists at the level of averages and statistics rather than at the level of lived reality and concrete events. Moreover, climate change occurs on a global scale, but its effects are regionally variable and often counterintuitive, rather than uniform, straightforwardly chronological and linear. Perhaps most significant with regard to these three texts, climate change is, thus far, happening gradually, and gradual change is difficult to perceive on a day-to-day basis.[17] In fact, the climate has already begun to shift; we witness climate change every day, yet fail to perceive it meaningfully at the level of sense perception.

[17] I want to foreground these issues of temporality and emphasize that the adjectives "gradual" and "abrupt" climate change have traction only in relative terms. The 'gradual' climate change we are currently experiencing, for example, is gradual only in human terms (rather than on a geologic timescale), and even in human terms, significant, measurable shifts in climate have taken place in the course of two generations. This puts the experience of climate change outside the realm of individual phenomenology but not outside the realm of collective memory. We might more accurately describe the pace of climate change as "decadal."

Most scholarly attention to media representations of climate change exists not in literary critical journals and books, but instead in scientific publications, in communication studies journals, and in what might be termed environmental journalism. Rather than fiction, most of these studies focus on news media. Those few studies that analyze fiction tend to focus on the accuracy with which science is represented, the plausibility of particular meteorological events depicted, along with some discussion of the potential for fictional accounts to advocate for environmental concerns.[18]

Anabela Carvalho's article on journalistic coverage of climate change in *Public Understanding of Science* stands out for its theoretical complexity and offers a jumping off point for further consideration of the literary and cultural significance of science fiction representations of climate change. "Ideological cultures and media discourses on scientific knowledge: re-reading news on climate change" examines ideological influences on representations of climate science in the British "quality" press. Carvalho's work builds upon Boykoff and Boykoff's analysis of the U.S. press, which argues that adherence to the journalistic norm of "balanced" reporting has led to a significant divergence between popular and scientific discourses of climate change. While peer-reviewed scientific consensus has consolidated over the past twenty-five years, mainstream news media has continued to provide a platform for contrarian science in order to maintain an image of journalistic balance.[19] Through a careful examination of

[18] In the era of new media, the internet also offers a vital tool for deconstructing narratives of climate change. Of note are websites such as http://www.realclimate.org, where climate scientists act as self-appointed fact-checkers, disambiguating representations of climate change in popular media.

[19] See here Boykoff, Maxwell T. and Jules M. Boykoff. "Balance as Bias: Global Warming and the US Prestige Press." *Global Environmental Change*. Vol. 14, 2004. pp. 125 - 136

climate change coverage in three British newspapers from 1985-2001 (*The Guardian, The Independent,* and *The Times*), Carvalho adds nuance to Boykoff and Boykoff's analysis, detailing the particular narrative conventions that characterize the different ideological biases these papers represent. In this group of newspapers, *The Guardian* is the only paper not owned by a conglomerate, and is the most leftist. *The Independent* leans toward the Labour party but often oscillates toward the right. And *The Times* is "a Conservative paper, committed to the establishment and to the sovereignty of traditional institutions," dominated by neoliberal ideology (Carvahlo 226). Carvahlo argues that certain rhetorical strategies characterize this perspective—the *Times* tended to take a Promethean view of man's relation to the environment while maintaining an image of scientific non-closure (doubt), essential to contesting calls for regulations to curb greenhouse gas emissions (Carvahlo 229). Notably, these rhetorical strategies also characterize the policy approach of the Bush administration to climate change. In contrast, *The Guardian* and *The Independent* conveyed an image of scientific consensus that emphasized the risks associated with climate change, generally demanding stronger political intervention on the problem. On both sides of the political spectrum, Carvalho argues, "by re-configuring the state of scientific knowledge in ways that justify and promote preferred courses of social, economic, and political action, newspapers discursively construct fields of action and inaction" (238).

Carvalho's analysis of news media offers a model for approaching fictional representations of climate change. Ideology is at work in fiction as well as journalism, although it takes different rhetorical forms. My analysis attempts to illuminate the complexities and contours of these various discursive, ideologically inflected narratives

of climate change. Both *The Day After Tomorrow* and *Forty Signs of Rain* engage what might broadly be considered 'environmentalist' ideology. Emmerich's film, however, frames climate change in tragic apocalyptic terms; it casts climate change as an inescapable catastrophe precipitated by the hubris of the global north, and in particular, by the arrogant exceptionalism of the United States. Although Emmerich intends his film to be "subversive," it ultimately fails to think constructively about solutions and adaptive strategies for addressing climate change, effectively reinforcing and reifying neoliberal ideology, albeit while ironically extrapolating its demise.

Crichton's novel, in its skepticism, presents an inevitable and predictable counterbalance to the alarmism and exaggeration of *The Day After Tomorrow*. *State of Fear* details the contrarian account of climate change and offers a critique of environmentalism, extolling the social virtues of the free market and the dangers of environmental market regulations. Properly understood, Crichton's novel takes its place within the line of contrarian anti-environmentalist texts that began to emerge in the 1980s and 1990s, including Julian Simon's *Hoodwinking the Nation*, and, as a fictional narrative, it represents one of the most sophisticated media engagements to date for these anti-environmentalist discourses emanating from conservative think tanks, "celebrating high-profile skeptical scientists as innovators daring to speak truth to tyranny of political correctness exerted by the IPCC and the mainstream scientific establishment" (Lahsen 156-157).

Kim Stanley Robinson's novel is the most ideologically complex of these three abrupt climate change narratives, escaping the seeming dichotomy established by Emmerich's film and Crichton's novel -- either climate change is going to destroy the

world, or climate change is not happening at all. In contrast to the fatalistic role that climate change plays in Emmerich's film, climate change in Robinson's novel catalyzes an interactive landscape within which characters work to envision an alternative geopolitical and economic world order. Robinson is sensitive to the pitfalls and possibilities of utopian fiction, and his work self-consciously investigates the interplay of multiple ideological perspectives, maintaining an open-ended and optimistic approach to his account of human adaptation to global warming.

It is instructive to contextualize these stories within the scientific and public policy discourses they engage. Comparison of these fictional texts to corresponding scientific and public policy scenarios illuminates an imaginative, literary impulse that is foundational to *all* thinking about climate change. Furthermore, the conversation between these three fictional climate change narratives illustrates the political and rhetorical dilemmas facing environmentalists and the political left more broadly in the United States today with respect to climate change. In these contesting narratives, we witness the shortcomings of a naive apocalyptic environmentalism for addressing the political, economic, and rhetorical challenges posed by climate change, the emotional appeal of free-market ideology together with the counter-narrative of climate change denial for the right, and finally, the necessity, on the left, of developing a platform that incorporates the insights of a progressive political ecology.

In February of 2004, *Fortune* magazine publicized an unclassified Pentagon report entitled "Imagining the Unthinkable: An Abrupt Climate Change Scenario and Its Implications for United States National Security," written in October of 2003 by Doug Randall and Peter Schwartz. Both authors are associated with the Global Business

Network, an international training and consulting firm dedicated to "enhancing client competitiveness" through scenario thinking. Schwartz is the chairman and co-founder of the company, and Randall is a senior practitioner and co-leader of the consulting practice. Self-described as an "internationally renowned futurist and business strategist," Schwartz is the former head of scenario planning for the Royal Dutch/Shell Group in London, and he served as a script consultant on Hollywood films, including *The Minority Report* and *Deep Impact*. Schwartz's role as script consultant reinforces the literary character of his work as a defense consultant and goes some distance toward blurring the distinction between fact and fiction with regard to scenario-thinking. If science-fiction is a subgenre within the literary world, it is a primary mode of thought for the military-industrial complex.

It seems initially significant that Pentagon even sponsored such a report, given the Bush administration's contrarian position on climate change. Schwartz and Randall effectively reverse the administration's stance; rather than indulging in contrarianism and uncertainty, they cite science suggesting some of the most extreme scenarios for climate destabilization, and frame their report in terms of prudence: "past examples of abrupt climate change suggest that it is prudent to consider an abrupt climate change scenario for the future as plausible, especially because some recent scientific findings suggest that we could be on the cusp of such an event" (Schwartz and Randall 7). They go on to explain the strategic purposes of scenario-thinking. It is worth quoting their description of the project in some detail:

> Rather than predicting how climate change will happen, our intent is to dramatize the impact climate change could have on society if we are unprepared for it.

> Where we describe concrete weather conditions and implications, our aim is to further the strategic conversation rather than to accurately forecast what is likely to happen with a high degree of certainty. Even the most sophisticated models cannot predict the details of how climate change will unfold, which regions will be impacted in which ways, and how governments and society might respond. However, there appears to be general agreement in the scientific community that an extreme case like the one depicted…is not implausible. Many scientists would regard this scenario as extreme both in how soon it develops, [and in] how large, rapid and ubiquitous the climate changes are. But history tells us that sometimes the extreme cases do occur, there is evidence that it might be and it is DOD's job to consider such scenarios. (7)

In Schwartz and Randall's formulation, plausibility, rather than prediction, is the goal of useful scenario thinking and meaningful strategic planning. Their description sounds like a definition of the parameters of science fiction. Their suggestion that "even the most sophisticated models cannot predict the details of how climate change will unfold, which regions will be impacted in which ways, and how governments and society might respond," highlights the importance of narrative in determining the shape of the future. The stories that we tell about how society and government might respond to climate change largely determine the field of possibility for those responses.

An abrupt climate change occurs when the climate system is forced to cross a critical threshold, beyond which the shift accelerates unpredictably. The most popular abrupt climate change scenario imagines that a large freshwater melt might trigger a salt advection feedback loop in the thermohaline circulation system, causing a slowing of the

conveyor. This model for abrupt climate change comes out of paleoclimatolgy—a stall in the thermohaline pump is the most likely mechanism responsible for a mini-ice-age during the Younger Dryas. "Imagining the Unthinkable" deploys this mechanism for its own thought experiment, describing a scenario in which melting Arctic ice floods the Atlantic with fresh water, dramatically slowing a local branch of the Gulf Stream. While the rest of the globe gets warmer, Western Europe and the east coast of North America get drastically colder. Climate destabilization leads to grain shortages around the world. Wars erupt over natural resources. Schwartz and Randall anticipate dystopia:

> Violence and disruption stemming from the stresses created by abrupt changes in the climate pose a different type of threat to national security than we are accustomed to today. Military confrontation may be triggered by a desperate need for natural resources such as energy, food and water rather than by conflicts over ideology, religion, or national honor. The shifting motivation for confrontation would alter which countries are most vulnerable and the existing warning signs for security threats. (14)

Despite their willingness to move beyond the Bush administration's contrarian stance towards global warming, Schwartz and Randall's report bears some important hallmarks of conservative ideology, particularly in its framing as a defensive concern. There is also an evident strand of reactionary nativism that gets naturalized in the following passage:

> The United States and Australia are likely to build defensive fortresses around their countries because they have the resources and reserves to achieve self-sufficiency. With diverse growing climates, wealth, technology, and abundant resources, the United States could likely survive shortened growing cycles and

> harsh weather conditions without catastrophic losses. Borders will be strengthened around the country to hold back unwanted starving immigrants from the Caribbean islands (an especially severe problem), Mexico, and South America. Energy supply will be shored up through expensive (economically, politically, and morally) alternatives such as nuclear, renewables, hydrogen, and Middle Eastern contracts. Pesky skirmishes over fishing rights, agricultural support, and disaster relief will be commonplace. Tension between the U.S. and Mexico rise as the U.S. reneges on the 1944 treaty that guarantees water flow from the Colorado River. Relief workers will be commissioned to respond to flooding along the southern part of the east coast and much drier conditions inland. Yet, even in this continuous state of emergency the U.S. will be positioned well compared to others. The intractable problem facing the nation will be calming the mounting military tension around the world" (18).

A spokesperson for the Pentagon officially played down the report, promising that it would not get passed along to Defense Secretary Rumsfeld. That the report was commissioned in the first place, however, suggests a shift in conservative thinking about climate change, and the dissemination of the report in *Fortune* marks an important entrance of the concept of abrupt climate change into the public imaginary.

Within the scientific community, serious discussions about similar mechanisms for abrupt climate change date back to the 1990s. As Bill McKibben explains in a 2004 review of the Schwartz and Randall document in the *New York Review of Books*, "The report is not novel—such visions of rapid and violent climate change have become common in recent years as our understanding of the wild weather swings in the climatic

temperature record has grown. Nor is it extremely unlikely—a series of recent papers in *Nature* have noted just the sort of freshening of Atlantic waters that could set off this particular sequence" (McKibben NYRB). I want to problematize McKibben's response here – McKibben demonstrates the desire of the environmental community to seize upon and amplify the rhetorical power of an "abrupt" scenario. McKibben elides the important issue of plausibility and evades the statistical issue of probability with the double negative of "not unlikely." The 2007 IPCC report, on the other hand, goes out of its way to indicate that this scenario is, in fact, unlikely. What McKibben misses in his haste to capitalize on this dramatic imagery is the more subtle strategy of framing climate change as a defensive concern that justifies unilateral military action and argues against international cooperation. Schwartz and Randall's report anticipates the fictional narratives of climate change that enter into circulation the following year. Furthermore, it suggests the policy-making significance of scenario thinking projects, in all of their similarity to science-fictional thought experiment, for engaging the challenges and concerns of climate change.

Roland Emmerich's *The Day After Tomorrow*, released in U.S. theaters early in the summer of 2004, exhibits a remarkable similarity to Schwartz and Randall's report. *The Day After Tomorrow*'s protagonist is Dr. Jack Hall (Dennis Quaid), a paleoclimatologist researching abrupt climate change for NOAA. When it is not reveling in the destruction of Los Angeles and New York City, the first half of the movie focuses on Hall's research and his attempts to model the quickly destabilizing climate; the second half follows Hall's harrowing journey to save his son (Jake Gyllenhaal), who takes shelter in the New York Public Library as ice covers the northern hemisphere in a matter

of hours. Like Schwartz and Randall, Emmerich imagines that polar meltwater causes a critical desalination in the current, leading to a precipitous drop in ocean temperatures.[20] Beyond this mechanism, however, Emmerich's film develops a tenuous relationship to meteorological plausibility. The drop in ocean temperature catalyzes a series of massive weather catastrophes around the globe. Tokyo is bombarded by softball size hail. Tornadoes descend upon Los Angeles, decimating the city. A massive storm surge floods New York City and then freezes in its streets. As the world prepares for the onslaught of an instantaneous ice-age, Hall advises the president to evacuate the southern United States to Mexico. The time frame is so short that inhabitants of northern states must be abandoned. As ice engulfs New York, Hall sets out to rescue his son.

The film's release produced a somewhat schizophrenic response within the scientific community. Concerned primarily with the portrayal of science in the film, scientists were eager to disambiguate the impossibilities and exaggerations of the film, while simultaneously trying to stress the urgency of responding to climate change. The Woods Hole Oceanographic Institute quickly published a webpage called "What's After the Day After Tomorrow?" offering "a science perspective on the science fiction movie." A Climate Modeling class at UC Santa Cruz initiated a grassroots public awareness campaign, sending students to local cinemas with fact sheets delineating science fact from science fiction and stressing the seriousness of global warming. And in its DVD release, the 2007 collector's edition of the film includes a documentary on the science of

[20] For more on the history of this scenario, Wally Broecker's 1987 commentary in *Nature*, "Unpleasant Surprises in the Greenhouse" is frequently cited as an early account of the science behind thermohaline circulation, explaining why it is a potential variable in future climate scenarios, as well as addressing some of the problems such a scenario poses for policy response.

abrupt climate change, including interviews with scientists from Woods Hole, Roland Emmerich, and John McCain and Joe Lieberman (revealing the centrist extent of Fox's "green" political agenda).

After September 11, 2001, the Bush administration instituted a dual rhetoric of terrorism and nationalism, redirecting public attention towards issues of national security and away from opportunities for international cooperation. Arguing for a world-historical reframing of post-9/11 politics, the Bush administration launched a broad "war on terror," justifying the opening of military fronts first in Afghanistan and Iraq. There is, in this trajectory of international politics, something like a post 9/11 aesthetic, in which the world looks like dystopia. In this discursive context, climate change and terrorism offer competing dystopian scenarios for the 21st century. *The Day After Tomorrow* pointedly portrays climate change as a threat more dangerous than terrorism, making explicit, ironic allusions to September 11th, as two planes are brought down by turbulence as they fly through a super storm system. In a parody of the dynamics between President George W. Bush and Vice President Cheney, the fictional President, looking worried, asks the Vice President, "What should we do?" Completing the analogy, they decide to ground all planes in United States airspace.

Significantly, Davis Guggenheim's 2006 documentary *An Inconvenient Truth* uses a similar strategy to frame its argument. Al Gore's relatively low-fi Power Point simulation of New York City flooding under rising seas resonates with echoes of the dramatic images in Emmerich's film. As the water rises, Gore points to the moment when the former site of the World Trade Center would be submerged, asking whether the

U.S. government should be concerned about more dangerous threats than international terrorism.

Each of these fictional texts depicts relationships between science and government worth parsing. In *The Day After Tomorrow*, the warnings of scientists are put off until too late. Science is depicted on the one hand as authoritative—Jack Hall's paleoclimate model accurately accounts for the climate shift that takes place—and on the other hand as eccentric, isolated, and poorly understood by administrative figures, especially the Vice President, but also including NOAA administrators. At a UN climate conference in India, the Vice President dismisses Jack Hall's lecture, arguing for the priority of economic considerations over speculative risk preparedness.

Problematically, however, Emmerich's film maps the rhetoric of nuclear catastrophe onto climate change. This analogy is implicit in the title, which echoes Nicholas Meyer's 1983 film *The Day After*. Meyer's film centers on Lawrence, Kansas in the aftermath of a full scale nuclear exchange with the Soviet Union. *The Day After*, made for TV, funded by ABC Circle Films, and originally aired without commercials, belongs in the genre of tragedy. It was meant as a warning, an attempt to raise public consciousness and advocate for de-armament. *The Day After Tomorrow*, on the other hand, was a summer blockbuster—an action-adventure movie—funded and released by 20th Century Fox. *The Day After Tomorrow* foregrounds spectacle over science, and thereby abdicates Schwartz and Randall's fundamental component of meaningful scenario-thinking: plausibility. *The Day After Tomorrow* also foregrounds spectacle over human drama. The audience does not understand as tragic the tornadoes that tear through Los Angeles; instead audiences revel in the fear of the victims and the thrill of

destruction. This concern for spectacle is characteristic of science fiction films. In "The Imagination of Disaster," Susan Sontag writes, "the science fiction film…is concerned with the aesthetics of destruction, with the peculiar beauties to be found in wreaking havoc, making a mess. And it is in the imagery of destruction that the core of a good science fiction film lies" (213). The limitations of *The Day After Tomorrow* in its advocacy project are, in large part, generic limitations. Discussing the unique characteristics of film versus the written narrative, Sontag writes, "In place of an intellectual workout, they can supply something the novels can never provide—sensous elaboration. In the films it is by means of images and sound, not words that have to be translated by the imagination, that one can participate in the fantasy of living through one's own death and more, the death of cities, the destruction of humanity itself" (212). The imagination of disaster is undoubtedly important. It is important as a warning, and it is important as a motivation for change. In a post-nuclear era of international terrorism, however, our imagination of disaster is robust and well-developed. Our utopian imagination, in contrast, has atrophied.

In his "Introduction" *The Ruins of Earth* (1973), science-fiction author Thomas Disch gestures toward the complex relationship between nuclear catastrophe and environmental science-fiction:

> The fifties were also the age of the Bomb. Nuclear catastrophe and its aftermath was then, for most of us, the worst nightmare we could imagine. It was unequivocally awful and (unlike today's horrors) *direct*. The bombs themselves were measured in units of how many millions of us they would kill—in 'megadeaths'.

> One learned to live with the bombs largely by looking the other way, by concentrating on the daytime, suburban side of existence. And here we are, a quarter of a century after Hiroshima, and the bombs still haven't dropped. Looking the other way seems to have worked.
>
> Now, in 1971, it isn't possible to look the other way. It is the daytime, suburban side of existence that has become our nightmare. In effect the bombs are already dropping—as more carbon monoxide pollutes the air of Roseville, as mercury poisons our waters, our fish, and ourselves, and as one by one our technology extinguishes the forms of life upon which our own life on this planet depends. These are not catastrophes of the imagination—they are what's happening. (Disch 11)

Writing in the early 1970s, Disch critiques the sense of helplessness inspired by narratives of nuclear apocalypse and points to the inadequacy of this narrative as an analogy for understanding environmental crises of toxicity and pollution. The rhetorical and aesthetic challenges posed by toxicity are similar to those posed by climate change. Climate change, like toxicity, is not immediately perceptible at the level of sensory experience. The powerful resonance of stories and images of nuclear catastrophe, along with Hollywood's demand for spectacle, has led to a tendency in American environmentalist discourse to oversimplify climate change, to think of global warming as an *event* rather than a *process*.

Nathan Hultman, professor of Science, Technology, and International affairs at Georgetown University, also emphasizes the importance of plausibility in narratives of climate change. In an article for *Geotimes* he writes,

> Many scientists, including Oceanographer Wally Broecker, climatologist Stephen Schneider, and *Science*'*s* Donald Kennedy, have observed, fiction-based media tend to emphasize low-probability, high-danger climate events. This choice, of course, should not be surprising. (How exciting would it be to "escape from Low-Security Detention" instead of "Escape from Alcatraz"?) Yet, in the real world, the media coverage of potential climate change scenarios tends to emphasize the uncertainty surrounding them. Unfortunately, this focus fosters the perception that much more probable – but still damaging – future scenarios are also unlikely and uncertain. (Hultman, June 2005)

Hultman is openly disdainful of Emmerich's disregard for science in *The Day After Tomorrow*, describing the film's plot as "pseudoscience."

In his 1979 article for *Science, Technology, and Human Values*, "Disaster Thrillers: A Literary Mode of Technology Assessment," John Woodcock, an English Professor at Indiana University, argues that disaster thrillers can "influence the public imagination without being perfectly plausible. Disaster thrillers primarily seek to convey not precise information but something more diffuse and generalized—an experience on which ideas and attitudes may be based. Because they are associated with an intense, engrossing experience, such ideas and attitudes may persist in spite of some evidence of their implausibility" (Woodcock 43). Woodcock cites "narrative's well known ability to effect suspension of disbelief" in defense of this theory. None of the novels that Woodcock examines, however, offer scenarios analogous to climate change. Two novels, *Airport* (1968) and *Supership* (1974) focus on transportation technology, one novel, *The Prometheus Crisis* (1975) focuses on the dangers of nuclear technology, and

the other two novels, *The Andromeda Strain* (1968) and *The Nightmare Factor* (1978) focus on the dangers of biotechnology and biological warfare.[21] Does Woodcock's argument, written in 1979 and formulated to address the environmental and technological anxieties of his day, also hold true for fictional accounts of climate change?

Thomas Lowe et al. (2006) performed an empirical research project with joint funding from the Tyndall Centre for Climate Change Research, the School of Development Studies and the Centre for Environmental Risk at East Anglia University, designed to gauge British viewers' reactions to the film in four categories—their perception of the likelihood of extreme impacts from climate change, their concern about climate change versus other global problems, their motivation to take action, and their perception of responsibility for the problem of climate change. In "Does Tomorrow Ever Come? Disaster narrative and public perceptions of climate change," the authors summarize their findings: "Overall, the film, like government policy, sends mixed messages, and, although it can be said to have sensitized viewers and perhaps motivated them to act on climate change, the individuals who participated in this study do not feel they have access to information on what action they can take or the opportunity in their daily lives to individually or collectively implement change" (Lowe et al. 453). In other words, Emmerich's film might succeed at generating concern, but it fails to motivate positive change or political action because it does not present solutions.

If tales of nuclear catastrophe present parables about technology and the dangerous possibilities of science, containing their own dialectic of apocalypse and

[21] Interestingly, Michael Crichton's nascent antagonism towards "politicized science" can already be seen in his early novel, which Woodcock rightly argues is about "the risk involved in science and government working together in complex biological areas, where knowledge is scant and control difficult at best" (40).

utopia, climate change offers a different lesson. Climate change is less an indictment of technology than an indictment of industrial capitalism and political economics more broadly considered. Its lessons entail a more thoroughgoing social critique. The aesthetic of nuclear catastrophe is an aesthetic of the technological sublime. Climate change, on the other hand prompts the necessity for a different aesthetic. Climate change, a social problem, necessitates a social solution. Climate change demands an aesthetic that integrates humans and nature, escaping the constraints of a discredited dichotomy and accounting for the complex relationships between the local and the global, the ecological and the economic. If it must be apocalyptic, it should be apocalyptic in the etymological sense—it should reveal, laying bare unjust structures of power. But climate change also demands a reconstructive vision—a new environmental aesthetic will inevitably maintain components of the pastoral and the georgic, as well as elements of a wilderness aesthetic, but ultimately, the social realities that coalesce around climate change call for a robust utopian aesthetic.

Emmerich's film fails to offer a useful heuristic for approaching climate change precisely because it fails to envision the possibility of a reconstructive response. In accordance with Sontag's assertion that "the science fiction film is concerned with the aesthetics of destruction," it paints the lessons of climate change in such broad and cataclysmic strokes that the audience is unable to imagine any alternative to impending disaster. The screen demands spectacle. As Lowe et al. argue, "The 'what ifs' of an intangible yet dangerous climate shift are replaced with deadly storm surges and iconic images such as the Statue of Liberty engulfed by ice" (438). *The Day After Tomorrow* ends up expressing anxieties that have nothing to do with climate change, or have to do

with it in only minimal ways—anxieties about the end of American empire and the ascent of the global South, for example, on whom Americans are forced to rely for help in the film. Emmerich's film is less about genuine opportunities for global community and cooperation than it is about an environmentally altered realpolitik that distributes retributive political justice. Ostensibly, it acts as a warning – pay attention to climatologists! But the vision of the future that Emmerich's film portrays is naively apocalyptic, the reconstructive potential of his social commentary stunted by the camera's indulgence in catastrophe.

Michael Crichton's *State of Fear* is a remarkable text. It might well be understood as an ideological counter-narrative to Emmerich's film, as it capitalizes on a sophisticated critique of the film's shortcomings. *State of Fear* might also be understood as an anticipatory strike against Al Gore's upcoming collaboration with Davis Guggenheim on *An Inconvenient Truth* (2006). With a first printing upwards of 1.5 million copies, Crichton's novel spent weeks on bestseller lists. More interestingly, *State of Fear* immediately received glowing reviews from conservative media outlets, and in January of 2005, Crichton lectured before a joint session of the American Enterprise Institute and the Brookings Institute, well-known conservative think-tanks. Soon after, Senate Environmental Committee Chair James Inhofe, the Oklahoma Republican who described global warming as "the greatest hoax ever perpetrated on the American people," called upon Crichton for expert opinion during 2005 Senate climate change hearings. Later that same year, Karl Rove, President Bush's infamous Chief of Staff, arranged a private audience between the novelist and the President. According to Fred

Barnes book *Rebel in Chief* (2006), Bush and Crichton "talked for an hour and were in near total agreement."[22]

Part action-thriller, part didactic tract meant to undermine the consensus science of climate change, *State of Fear*'s plot ranges from the Arctic to the South Pacific. The protagonists—a well-intentioned but naive junior lawyer, a millionaire philanthropist, his beautiful female assistant, a mountain-climbing scientist and government secret agent, and his Sherpa sidekick—uncover a scheme by ecoterrorists to use stolen military equipment to amplify natural disasters and simulate the imagined impacts of a sudden climate change. Through this investigation, the philanthropist learns that the National Environmental Resource Fund (NERF), an environmental organization to which he has been donating money, is actually a front for these eco-terrorist groups. Along the way, the scientist, John Kenner, an MIT professor, risk management specialist, and counterterrorist agent, delivers a series of mini-lectures undermining the theory of climate change. The young lawyer, with whom the reader is intended to identify, thus comes to understand that climate change is unproven theory and overstated threat.

Crichton adorns his novel with the apparatus of scientific research, including footnotes, charts, appendices, and a bibliography. Preceding the novel, Crichton offers an unusual disclaimer: "This is a work of fiction. Characters, corporations, institutions, and organizations in this novel are the product of the author's imagination, or, if real, are used fictitiously without any intent to describe their actual conduct. However, references

[22] See here Michael Janofsky's "Michael Crichton, Novelist, Becomes Senate Witness" in the *New York Times,* Sept. 29, 2005, and Janofsky's "Bush's Chat With Novelist Alarms Environmentalists" in the *New York Times,* Nov 19, 2007.

to real people, institutions, and organizations that are documented in footnotes are accurate. Footnotes are real." Crichton dresses his novel in the trappings of scientific scholarship, presenting science-fiction as science fact and vice-versa, intentionally highlighting the narrative character of global warming discourse. In 2005, the American Association of Petroleum Geologists gave Crichton its Journalism Award for *State of Fear,* an award that underscores Crichton's footnotes and grants a kind of dubious legitimation to his scholarship.[23]

In an "Author's Message" at the end of the novel, Crichton summarizes his views on the science of climate change. His bullet-point insights proclaim: "Nobody knows how much of the present warming trend might be a natural phenomenon;" "Nobody knows how much of the present warming trend might be man-made;" "Nobody knows how much warming will occur in the next century." Expressing optimism about the future, Crichton writes, "I suspect that the people of 2100 will be much richer than we are, have a smaller global population, and enjoy more wilderness than we have today. I don't think we have to worry about them" (Crichton 625-627). Significantly, Crichton's message here echoes Republican Party talking points in 2004, a crucial election year. In April, prior to the release of Crichton's novel, *the Guardian* broke a story about an email memo sent from the White House to press secretaries of all Republican congressmen on September 4, 2004, advising them what to say when questioned on the environment in the run-up to November's election. As Antony Barnett reports, "The memo -- headed 'From medi-scare to air-scare' – goes on: 'From the heated debate on global warming to the hot

[23] See here Cornelia Dean's "Truth? Fiction? Journalism? Award Goes to…" in the *New York Times,* Feb. 9, 2006.

air on forests; from the muddled talk on our nations waters to the convolution on air pollution, we are fighting a battle of fact against fiction on the environment – Republicans can't stress enough that extremists are screaming "Doomsday!" when the environment is actually seeing a new and better day.'" (Barnett, *The Guardian*, April 4, 2004).

In certain respects, Crichton's novel actually functions similarly to Rachel Carson's *Silent Spring.* Indeed, it mimics successful publicity strategies and engagements with other media outlets employed by Carson and her publishers in pursuing policy reform. In *What a Book Can Do* (2005), Patricia Coit Murphy argues convincingly for the materiality of Carson's book as the most important characteristic accounting for its ability to prompt social change. Published first as a *New Yorker* article and then by Houghton Mifflin as a book, *Silent Spring* operated differently in each medium. As a book *Silent Spring* achieved a popularity and notoriety it could not achieve as journalism; it was picked up by various book clubs, passed from friend to friend. Carson appeared in television and newspaper interviews and testified in congressional hearings. As only a book can do, *Silent Spring* circulated in material culture and interacted with other media in ways that contributed to its cultural significance. *State of Fear* functions similarly. Published and distributed by Harper-Collins to an established and sizeable Crichton fan base, promoted by right-wing bloggers and talk-show hosts, touted by prominent Republican politicians like James Inhofe as "required reading" on climate change, and publicized by word of mouth, Crichton's novel does not necessarily need to be read in order to spread its contrarian message. Moreover, his novel offers a direct counter-narrative to *Silent Spring*. At

several points in the story and then again in his afterword, Crichton specifically addresses DDT and contradicts popular (and peer-reviewed scientific) opinion about the chemical pesticide, arguing that banning DDT in developing tropical nations has caused hundreds of thousands of deaths from malaria and other mosquito-borne viruses. If Carson argues for ecology and the precautionary principle, Crichton's science is risk analysis emphasizing uncertainty combined with a promethean faith in human technological ingenuity.

In this valorization of contrarian science, Crichton joins a distinctively American tradition of counterscience (fiction) that includes Julian Simon's *Hoodwinking the Nation* (1999) and Ronald Bailey's *Ecoscam: The False Prophets of Ecological Apocalypse* (1993). These authors are part of a counterscience crisis-debunking industry that began to gain traction in the 1980s, funded in large part by conservative financial elites and right-wing think-tanks. As Myanna Lahsen and others, such as Frederick Buell and Anne and Paul Ehrlich, have shown, the scientific mainstream, as represented by the IPCC and other scientific institutions, "has repeatedly been challenged by a coalition of actors advancing competing interpretations of the science underpinning environmental concern and opposing policy action on behalf of climate change. This coalition has had significant impact on U.S. climate politics, both inside and outside of government" (Lahsen 143). Lahsen explains that the "environmental backlash" has relied predominantly on a group of ten scientists as providers of essential scientific authority. Lahsen rightly emphasizes that the "high profile climate dissidents are largely a U.S. phenomenon" (143). Germany, Sweden, and England, along with a few other countries, host one or two skeptics each, but no other country has such a high concentration.

Tranlating this counterscientific discourse into the realm of fiction, Crichton's novel highlights the ideological production of scientific knowledge. In his thoroughgoing ideological commitment in *State of Fear*, it almost seems that Crichton aims to become a kind of latter-day Ayn Rand.

A potential hypothesis one might deduce from these examples is that neoconservative interests have embraced the ambiguity between fact and fiction, while liberal interests have tended to re-inscribe a more rigid distinction between the two terms. This valorization of "science fact" in discussions of climate change can be seen as extension of liberalism's roots in Enlightenment thought and its attendant fetishization of rationalist discourse. Perhaps the primary effect of indulging in the distinction between science fiction and science fact, rather than clarifying the proper subject of debate (the peer review process), however, has been the generation of a broad field of discursive equivocation -- tending to benefit those who wish to stall global warming policy initiatives as much as it bolsters those who wish to promote them.

In his review of *State of Fear* for *The New Republic*, Michael Crowley summarizes Crichton's career in this way:

> You can read these books in search of an ideology, but you won't find a distinct one. Clearly, Crichton is no liberal…. But a free-market conservative wouldn't write an essentially protectionist book like *Rising Sun*, either. What Crichton's world-view really amounts to is a kind of hectoring contrarianism that is increasingly targeted at America's know-it-alls, against the liberal elites, against the very type of expertise that had given him his professional cache. And that worldview has reached its bitter, frothing apex with *State of Fear*. (Crowley 18)

Crowley gives Crichton less credit than he deserves. Even if Crichton's larger corpus does not express a consistent ideological position, *State of Fear* represents a cunning engagement with the far right of the political spectrum. As Fredrick Buell argues in *From Apocalypse to Way of Life* "conservative antienvironmental rhetoric was crafted from the start as part of a larger package. It cannot be discussed in isolation from the broader stream of right-wing political discourse" (Buell 6). Conservatives have mobilized several counter-narratives to climate change, including narratives of terrorist dystopia, narratives of environmental stability, and narratives of technological progress, and Crichton deploys each of these counter-narratives in *State of Fear*. As a form of scenario thinking, Crichton's novel imagines a "global warming" scenario that reinforces free-market ideological biases, justifies the Bush administration approach to climate change, and reinforces the association of environmentalism with terrorism.

Crichton's novel performs ideological work in several registers. Most notably, Crichton uses the rhetorical power of legal discourse to facilitate and legitimate his deconstruction of the environmentalist narrative. Crichton frames his story in the context of a lawsuit brought by the fictional Pacific island nation of Vanutu against the Environmental Protection Agency of the United States over its failure to regulate carbon emissions. Vanutu, perched only a few feet above sea-level, faces the prospect of having to evacuate its eight thousand residents because of rising sea levels. The United States, the largest economy in the world, is also the largest emitter of carbon dioxide, and therefore the largest contributor to global warming. NERF agrees to join forces with Vanutu in the lawsuit. The book begins with the revelation that the lawsuit was never

filed, and unraveling the mystery behind this failure to file becomes the substance of the book's plot.

Crichton deploys the device of this court case several times throughout the narrative. We witness the legal team's difficulties each time Peter Evans visits the litigation headquarters in a warehouse south of Culver City. In order to enter the complex, Evans undergoes a rigorous security check to ensure that he's not wired. Crichton suggests a level of security indicative of paranoia and he repeatedly emphasizes the complexity of the operation. As Evans scans the room, he is overwhelmed by the scale of the endeavor:

> They entered an old warehouse—a vast, high-ceilinged space, separated into large rooms by glass partitions. Immediately to his left, behind glass, Evans saw a room filled with computer terminals, each manned by a young person with a stack of documents beside their keyboard. In big lettering on the glass, it said, "DATA-RAW."
>
> To his right, there was a matching conference room labeled "SATELLITES/RESONDE." Evans saw four people inside that room, busily discussing huge blowups of a graph on the wall, jagged lines on a grid.
>
> Further along, there was another room marked "GENERAL CIRCULATION MODELS (GCMS)." Here the walls were plastered with large maps of the world, graphical representations in many colors.
>
> "Wow," Evans said. "Big operation."
>
> "Big lawsuit," Jennifer Haynes replied. "These are all our issue teams. They're mostly graduate students in climate science, not attorneys. Each team is

researching a different issue for us." She pointed around the warehouse. "The first group does raw data, meaning processed data from the Goddard Institute for Space Studies at Columbia University, in New York, From the USHCN at Oak Ridge, Tennessee, and from Hadley Center in East Anglia, England….

"The team there is doing comparative analyses of GCMs—meaning computer generated climate models—from the 1970s to the present. As you know, these models are immensely complex, manipulating a million variables or more at once. They are by far the most complex computer models ever created by man. We're dealing with American, British, and German models, primarily."

"I see…" Evans was starting to feel overwhelmed. (Crichton 85-86)

Evans' awe at the size of the litigation team, comprised mostly of scientists, is meant to underscore the complexity of climate change as a scientific theory. Evans, intelligent and well-educated, assumes that he clearly understands the theory of climate change, but when he is put in the hot-seat and interrogated, as he is each time he visits the litigation team, he is forced to admit that he knows surprisingly little scientifically accurate information about global warming.

The 2007 Supreme Court decision in the case of *Massachusetts v. EPA* substantially undermines the rhetorical force of Crichton's legal discourse. While the possibility of another country suing the EPA is unlikely ever to overcome the hurdle of establishing standing within the court, the Supreme Court's decision that Massachusetts (and its coalition of plaintiffs) does have standing suggests that international litigation may be unnecessary. When *State of Fear* was published, however, Crichton's treatment of the issue seemed warranted. *Massachusetts v. EPA*, begun in 2003, was repeatedly

thrown out of lower courts over the issue of standing, until the Supreme Court reversed these decisions in 2007. The court's decision that Massachusetts does have standing, and moreover, that the EPA is obligated, under the provisions of the Clean Air Act, to regulate carbon emissions, suggests that the discourse of scientific uncertainty about climate change has begun to crumble in the face of scientific consensus about the anthropogenic origins and the impending danger of global warming.

Crichton furthers the ideological agenda of the political right by tapping into post-9/11 fears of terrorism. In contrast to Emmerich's desire to cast terrorism and environmental concerns as competing threats for the 21st century, Crichton casts them as one and the same—portraying mainstream environmentalist groups as unwitting fronts for terrorist organizations. Crichton's novel thus reflects the fate of "radical environmentalism" during the Bush administration.

Crichton aims his most sardonic wrath at Hollywood and the media, caricaturing with spite what might be termed "celebrity environmentalism," including pointed jabs at "Leo" and a character named Ted Bradley, who shares with Martin Sheen the distinction of having "played the President on TV." Crichton's portrayal of radical environmentalists using military technology to generate weather catastrophes parodies Hollywood's use of special effects technology to generate jaw-dropping, spectacular representations of climate change.

Crichton's novel thus constitutes a counterbalance to the rhetoric of catastrophe found in films like *The Day After Tomorrow*. He undermines scientific consensus by means of an archetypical romantic figure: a brilliant, good-looking, contrarian scientist and mountain climber turned NSIA (National Security Intelligence Agency) agent.

Generally, he inspires awe in military technology, a force more powerful than nature. *State of Fear* is more than just anti-expert; it is anti-nature. Crichton invokes only the dangerous side of nature in the un-natural disasters that the book chronicles -- floods, tsunamis, earthquakes. At the same time he advocates a pro-technology, free-market environmentalism.

Nathan Hultman, in his article for *Geotimes*, argues that "the central tenet of the novel is that climate science suffers from a crippling lack of rigor – indeed, that it is driven by environmentalist dogma instead of dispassionate inquiry – and that the quest to mask scientific flaws leads the environmental lobby to criminal activity" (Hultman June 2005). Crowley takes Hultman's argument a step further, suggesting that "Crichton has relentlessly propagandized on behalf of one big idea: that experts—scientists, intellectuals, reporters, and bureaucrats—are spectacularly corrupt and spectacularly wrong…Crichton's oeuvre has promoted, for an audience of millions, a damning critique of expertise. And the Bush administration has put this critique into action, trampling the opinions of government scientists, exorcising trained economists, muzzling the press, and stifling State Department wonks. Crichton, in other words, primed America for the Bush administration" (Crowley 16).

Crowley's analysis correctly emphasizes the similarities between Crichton's writing and the rhetorical stance of the Bush administration with regard to climate change, but the charge of anti-expert does not entirely fit Crichton's strategy in *State of Fear* nor does it fit the Bush administration's approach to climate change. The disregard both Crichton and Bush demonstrate is not for expertise, per se, but for something more subtle and insidious to undermine: peer-review, consensus, cooperation and precaution.

John Kenner, the book's debunker hero, is not anti-intellectual. In fact, he is a highly trained and credentialed expert. When Peter Evans looks up Kenner's biography for Morton, he finds this resume:

> Richard John Kenner, William T. Harding Professor of Geoenvironmental Engineering…. He is thirty-nine. Doctorate in civil engineering from Caltech at age twenty. Did his thesis on soil erosion in Nepal. Barely missed qualifying for the Olympic ski team. A JD from Harvard Law School. Spent the next four years in government. Department of the Interior, Office of Policy Analysis, Scientific advisor to the Intergovernmental Negotiating Committee. Hobby is mountain climbing; he was reported dead on Naya Khanga peak in Nepal, but he wasn't. Tried to climb K2, driven back by weather…. He then went to MIT, where I'd say his rise has been spectacular. Associate professor in '93. Director of the MIT Center for Risk Analysis in '95. William T. Harding Professor in '96 . Consultant to the EPA, the Department of the Interior, the Department of Defense, the government of Nepal, God knows who else. Looks like a lot of corporations. (Crichton 61-62)

In their recent internal critique of American environmentalism, *Break Through* (2007), Ted Nordhaus and Michael Shellenberger add nuance to Crowley's characterization of Crichton as contrarian, "What environmentalists misunderstood about Crichton is that he is motivated not by anti-environmentalism per se, but rather by scientific contrarianism…. What is common to both *State of Fear* and *Prey* is a faith in the rugged scientific individual motivated purely by love of Truth" (Nordhaus and Shellenberger 139). Shellenberger and Nordhaus contend that in *State of Fear*, "environmentalists

willing to look can see their own scientism reflected back at them, distorted only modestly by Crichton's preference for the contrarian scientist" (140).

Myanna Lahsen's "Experiences of modernity in the greenhouse: A cultural analysis of a physicist 'trio' supporting the backlash against global warming," offers further insight into the world of contrarian climate science. Lahsen, a scholar at the University of Colorado's Center for Science and Technology Research, performs an anthropological critique of physicists at the George C. Marshall institute who have lent their scientific authority to global warming skepticism. She suggests that these scientists joined the environmental backlash to preserve a competing vision of modernity in which physics research received primary funding allocation and in which these particular figures remain part of a physicist elite. During the Bush administration, they have maintained their positions of power by brokering skepticism in order to legitimate neo-conservative policies and agendas with regard to climate change. Lahsen's article articulates a correlation between scientific paradigms and political ideology and argues that a shift must take place in both realms to appropriately address climate change (Lahsen 204-219).

The ideological force of this scientific skepticism drives Crichton's novel. In *State of Fear*, the best and brightest scientists work for the government in a defense capacity, as counter-terrorist agents. In *State of Fear* science is presented as authoritative only when it is contrarian, and according to Crichton's terms, de-politicized. Crichton's purported desire to de-politicize science is, however, both impossible and disingenuous. In fact, Crichton constructs the politicized science that he claims to reject. Crichton associates neoconservative ideology with scientific objectivity while he simultaneously

frames climate change as a naively liberal issue, characterizing government response in terms of economically detrimental regulations rather than positive initiatives.

Acknowledging its questionable motives and unconscionable ambiguations, however, Crichton's novel nonetheless constructs a critique of American environmentalism that hits surprisingly close to the mark. In his author's message, Crichton writes, "In the thirty-five-odd years since the environmental movement came into existence, science has undergone a major revolution. This revolution has brought new understanding of nonlinear dynamics, complex systems, chaos theory, catastrophe theory. It has transformed the way we think about evolution and ecology. Yet these no-longer-new ideas have hardly penetrated the thinking of environmental activists, which seems oddly fixed in the concepts and rhetoric of the 1970s" (Crichton 628). Crichton's commentary is substantively similar to the internal critique of environmentalism outlined in Ted Nordhaus and Michael Shellenberger's recent book *Break Through: From the Death of Environmentalism to the Politics of Possibility* (2007). Nordhaus and Shellenberger also accuse the environmental movement of being stuck in an outmoded conceptual framework, formulated in the late 1960s and early 1970s. They contend that environmentalists exhibit an overdependence on visual imagery – the view of the earth from outer space, the Cuyahoga in flames, polar bears on melting ice, glaciers retreating, toxic waste dumps. Shellenberger and Nordhaus argue that:

> the overreliance of environmentalists on visual evidence of humans' degradation of nature is a consequence of the environmentalists' interpretive framework; principally the idea of pollution….the meaning of the word *pollution* depends on the concept of nature as pure, harmonious, and separate from humans. Pollution

> is this kind of contamination, or violation of nature by humans. Similarly, human development is an encroachment upon nature. These are not simply analytical categories but moral ones as well. Nature has been unjustly violated by mankind. (24-25)

Shellenberger and Nordhaus contest these categories. Of the three primary texts under consideration, Kim Stanley Robinson's novel makes the greatest progress towards articulating the kind of original and progressive environmental position on climate change that Shellenberger and Nordhaus call for.

Released in the United States in June of 2004, Robinson's novel *Forty Signs of Rain* imagines an abrupt climate change scenario within more nuanced scientific parameters and with a more complex socio-political agenda than *The Day After Tomorrow*. The novel is the first installment in Robinson's *Science in the Capital* trilogy, and as such, *Forty Signs of Rain* lays the groundwork for much of what follows in the next two series installments. Released in 2004, *Forty Signs of Rain* also operates in direct conversation with *The Day After Tomorrow* and *State of Fear*. Set in an alternative present, *Forty Signs of Rain* explicitly parodies the Bush administration and its attitude towards climate change. Like the other narratives of climate change produced in 2004, Robinson's text also juxtaposes terrorism and climate change. In Robinson's trilogy, however, the terrorist threat is one of domestic surveillance and "double black" intelligence agencies that operate without oversight.

Like Schwartz and Randall's Pentagon report and *The Day After Tomorrow*, Robinson's novel imagines that a stall in the mid-Atlantic current initiates an abrupt climate shift. And like *State of Fear*, Robinson's novel is concerned with the fate of an

island nation threatened by sea-level rise. Unlike *The Day After Tomorrow*, however, the abrupt climate shift in *Forty Signs of Rain* stays within the parameters of plausibility. While an abrupt climate shift remains a relatively unlikely scenario for how climate change will unfold, Robinson's treatment of this scenario contains a level of nuance that makes it a useful thought experiment. And unlike *State of Fear*, Robinson's island nation of Khembalung does not pursue litigation as a solution to its problems; instead, it pursues diplomatic negotiation, offering the reader insight into the world of politics and lobbying on Capitol Hill.

In his short essay "Imagining Abrupt Climate Change: Terraforming Earth," Robinson describes his project in terms remarkably similar to Schwartz and Randall's Pentagon report. Robinson writes,

> Abrupt climate change has struck our species before, and we have adapted…in these past crises, even prospered. It could happen again...; no reason to despair; no reason to deny all problems and carry on stupidly in our destructive ways and ridiculously unjust economic system; rather, time to adapt.
>
> But the story of that adaptation has to be told, and told many times over, I think, so we can imagine it better, and see how we might take the first small steps. (18)

Where Schwartz and Randall portray climate change as a threat against which the United States must construct a fortress, however, Robinson imagines an opportunity for international cooperation and the transformation of global economic and political priorities. Where Schwartz and Randall imagine dystopia; Robinson envisions utopia. Robinson's novels can thus be seen as a counterpoint to the Schwartz and Randall piece.

One might argue that thinking through climate change in terms of defense inevitably involves a kind of fortress thinking, but fortress thinking nonetheless represents a failure of imagination. While climate change poses a geopolitical challenge for the future, it need not necessitate war. We need not consign ourselves, Robinson argues, to dystopia. Robinson explains,

> I have decided to write about characters who are scientists, working for the U.S. government (thus for all of us): a domestic comedy about global catastrophe—and how we might avoid it, or even counter it once it starts. I've taken this comic approach because ultimately I want the novel to be a utopian novel, despite the dangers outlined. It has occurred to me more than once that the imminent possibility of an environmental disaster—indeed the sheer fact that we are already entering one, either abrupt or not—might force us to change our ways sooner rather than later, and that this would be a very good thing for our children and our children's children, and all the generations to come. Thus, depending on how we react to it, the possibility of abrupt climate change could be a *good thing*.
>
> (Robinson IACC 17)

Robinson's optimism here is characteristic of his approach in the trilogy.[24] We can begin to see Robinson's approach to climate change as a challenge, rather than a catastrophe, by contrasting the tidal surge that decimates New York in *The Day After Tomorrow* with the flood that inundates Washington D.C. at the end of *Forty Signs of Rain*. In addition to creating adversity, rather than catastrophe, Robinson's flood also creates meaningful

[24] Asked in a 2006 *World Watch* interview with Eric Assadourian whether or not he is optimistic about "our future response to climate change," Robinson responded, "I am optimistic as a matter of policy."

opportunity—new forms of social interaction emerge, new forms of cooperation, even new forms of recreation.

Forty Signs of Rain tells the stories of a wide-ranging cast of characters. Frank Vanderwal is the book's primary protagonist, a sociobiologist on leave from UCSD's Department of Bioinformatics and working at the NSF for a research year. Vanderwal "liked to see patterns emerge from the apparent randomness of the world. This was why he had recently taken such an interest in sociobiology; he had hoped there might be algorithms to be found there which would crack the code of human behavior. So far that quest had not been very satisfactory, mostly because so little in human behavior was susceptible to a controlled experiment, so no theory could even be tested" (Robinson 25). Vanderwal's sociobiological approach to the challenges presented throughout the novel makes explicit otherwise unquestioned assumptions about human nature, in addition to highlighting the limits of human knowledge.

Robinson strives to dramatize the practice of science, from research and experiment to peer-review. Robinson makes a point of describing the peer-review process early in the novel: "No part of the scientific community could afford to be *too* picky about conflicts of interest. If they were, they'd never find anyone free to peer-review anything; hyperspecialization made every field so small that within them, everyone seemed to know everyone. Because of that, so long as there were no current financial or institutional ties with a person, it was considered okay to proceed to evaluate their work in the various peer review systems" (23). Robinson's clear and nuanced engagement with the peer-review process demystifies the world of science for the public. Robinson is further interested in the peer-review process because it offers a kind of

alternative economic model: "science didn't work like capitalism…money was too simplistic and inadequate a measure of the wealth that science generated…science was…a place that one entered agreeing to hold to the strategies of cooperation, to maximize the total return of the game" (133).

Robinson's novels rely heavily upon his use of free-indirect discourse, and what we begin to see in *Forty Signs of Rain* is Robinson's major achievement in these novels, the articulation of a distinctive kind of postmodern consciousness: a *glocal* consciousness, concerned with integrating both the global and the local. Robinson attempts to articulate an ideology that makes sense of the complexity of the current economic and political world order. Robinson's articulation of this evolving form of consciousness emerges from the distinctive setting of his novel—set in Washington DC and emphasizing the role of the NSF in policy-making debates allows Robinson to transition back and forth between global and local concerns for the characters. In *Forty Signs of Rain*, globalism is made concrete in the form of the Khembalis, and in their conversations with Frank, Anna, and Charlie, we begin to see a new *glocal* consciousness emerging.

CHAPTER V

TERRAFORMING THE FUTURE

> *It takes no great skill to decode the world system today. A tiny percentage of the population is immensely wealthy, some are well off, a lot are just getting by, a lot more are suffering. We call it capitalism, but within it lies buried residual patterns of feudalism and older hierarchies, basic injustices framing the way we organize ourselves. Everybody lives in an imaginary relationship to this real situation; and that is our world. We walk with scales on our eyes, and only see what we think.*
>
> --Kim Stanley Robinson, *Forty Signs of Rain*

If science fiction is the genre of climate change, Kim Stanley Robinson is its bard. Robinson's literary career has been dedicated to exploring questions pertinent to ecological sustainability. Alternately described as "hard science fiction," as "literary science fiction" and as "environmental science fiction," Robinson is well-regarded in the worlds of science fiction fans and in the ivory towers of academe, and as the winner of *Time* magazine's 2008 "Hero of the Environment" award, he is increasingly recognized as an important figure in environmental circles as well. He is most famous for his *Mars* trilogy, for which he won both Hugo and Nebula awards.[25] Scholarly attention to Robinson stems in part from his own scholarly credentials and his continuing dialogue

[25] Hugo Awards are presented each year at the World Science Fiction Convention for excellence in the field of science fiction and fantasy. Voting is open to members of the World Science Fiction Society. Hugo Awards, named for Hugo Gernsback, the founder of *Amazing Stories*, were first awarded in 1953, and have been awarded every year since 1955. The Nebula Awards are awarded by the Science Fiction Writers of America (SFWA) to acknowledge excellence in science fiction writing. Nebula Awards have been given each year since 1965 for the best novel, novelette, novella, and short story eligible for that year's award, and since 2000, for the best screenplay as well.

with the academic community. Robinson earned a PhD in literature from the University of California at San Diego, where he studied under the direction of Fredric Jameson and wrote his dissertation on Philip K. Dick. Robinson thanks Jameson in his acknowledgements for the *Mars* trilogy, and he acknowledges both Darko Suvin and Gary Snyder in his *Science in the Capital* trilogy. Jameson holds Robinson in similarly high regard, naming "Kim" as one of his "comrades in the party of Utopia," to whom he dedicates *Archaeologies of the Future*.

Of his longer works, Robinson's *Californias* trilogy looks the most like a scenario-thinking exercise. Written during the 1980s, Robinson uses a series of three alternate histories to explore of the role of technology in society. *The Wild Shore* (1984) imagines a future after nuclear disaster; *The Gold Coast* (1988) imagines a hyper-technological dystopia; and *Pacific Edge* (1988) imagines an eco-technological utopia. These were his first major novels, and they earned him early critical attention, with *Pacific Edge* winning the John W. Campbell award.

Much of Robinson's work is invested in this kind of alternative historical thinking. In his 1984 short story "The Lucky Strike," Robinson imagines that the *Enola Gay* crashes before its mission to Hiroshima, leaving a different crew to deliver the bomb. The bombardier of the *Lucky Strike* disobeys orders and delays his drop, missing Hiroshima and bombing the harbor instead. More recently, Robinson's *Years of Rice and Salt* (2002) presents an alternate history in which the plague takes such a toll on Medieval Europe that Islamic and Buddhist cultures become the predominant influences on Western history. These alternative histories help to illuminate the ways that even Robinson's outer-space fiction operates in a historical register -- the *Mars* trilogy presents

future history, for example -- while the *Science in the Capital* trilogy imagines an alternative present. Robinson's use of this historical mode hinges on turning points, or branch moments in history – moments of profound geopolitical opportunity, places on the time line where altering the course of events might produce radical changes in the structure of the future. Scenario planning, as we have seen, also turns on this same concept.

In his introduction to *Future Primitive: the New Ecotopias* (1994) Robinson describes science fiction narratives as

> historical simulations, which start at the present and then state *if we do this we will reach here, or if we do that we will reach there*. It is a mode of thought that is utopian in its very operating principle, for it assumes that differences in our actions now will lead to real and somewhat predictable consequences later on—which means that what we do now matters. Science fiction is play that helps teach us how to act, like the wrestling of tiger cubs. (9)

Combining scientific modes of thought, such as extrapolation and thought experiment, with what we might consider the more literary tools of fiction, from characterization and dialogue to metaphor and symbol, science fiction presents a unique laboratory in which writers explore consequences and possibilities and experiment with alternatives to the status quo. In this sense as well, Robinson sees his work in similar terms as scenario thinkers, understanding storytelling as a way of rehearsing the future.

Robinson has been writing about climate change since his *Mars* series, though not as explicitly as in the *Science in the Capital* trilogy. As 1990s science fiction, the *Mars* trilogy belongs alongside Octavia Butler's *Parables*, and also alongside Bruce Sterling's

Heavy Weather (1994). In this comparison, Sterling's novel offers probably the most ironic vision, imagining a kind of extreme-sports cyberpunk environmentalism on an altered Earth. In the *Parables*, Butler imagines a near future set on earth, and dreaming of a destiny amongst the stars. Environmental catastrophe operates as a part of the background, and her depictions of the structural aspects of inequality in the future reveal the ways that the present is already barbaric. The series ends as humans send the first colonists to space. The *Mars* trilogy is the most world-historical in its scope, involving as it does several worlds within its narrative frame, and Robinson is probably the most optimistic of the three in terms of the possibilities that he lays out for an alternative future.

The *Mars* trilogy imagines the successful human habitation of Mars, and it follows several hundred years of Martian history. From *Red* to *Green* to *Blue*, humans terraform the Martian landscape, changing the atmosphere to raise the surface temperature and make it suitable for breathing, altering the biosphere by introducing lichens, plants, and animals, and eventually melting the polar ice caps so that there are oceans on the surface of the planet. Like Butler's *Parables*, but longer, the *Mars* trilogy is a utopian epic of biblical proportions. It mixes hard science fiction with political science fiction and uses realism as a descriptive mode. Its primary critique is aimed at global capitalism, with equal emphasis on constructing a viable ecological politics. In his "Afterword" to Patrick Parrinder's *Learning from Other Worlds*, Darko Suvin describes the *Mars* trilogy as "thick history" and Robinson's project as "the filling in of King Utopus's trench" (253).

The characters in the Mars trilogy, especially members of the First Hundred, come to represent political positions on a spectrum from anarchist to corporatist, Red to Green, and the dialogue that emerges between them simulates the multiplicity of viewpoints that might be engaged around the scientific-political management of planetary ecology. The conflicts in these novels are frequently archetypal. For example, the fight between Sax Russell and Ann Clayborne over the terraforming project -- Sax promotes deliberate terraforming, while Ann fights to preserve Mars as it was before human contact -- lasts throughout all three novels and maps roughly onto the split between conservationism and preservationism on Earth, although Ann's view also deserves attention as a form of radical geocentrism. Hiroko Ai represents a third position in this debate – one that might be described as spiritual biocentrism. Her worship of "viriditas" – the life force – goes beyond anthropocentrism, but remains decidedly biological. Robert Markley argues that the more explicitly political leaders of the revolution -- John Boone, Frank Chalmers, and Maya Toitovna -- explore the relationship between political idealism and a more cynical power politics. As the novels progress, the relationship between scientific, religious, and political positions becomes increasingly complex.

In *Science Fiction and Empire* (2007), Patricia Kerslake reads the *Mars* trilogy as an important postcolonial narrative, arguing that it "gives us images both of the ineluctable nature of the imperial drive and of its oblique alternatives: a future which, Robinson suggests, sways between the poles of pessimism and optimism, with the ultimate outcome of a postcolonial functionality" (156). Kerslake also comments upon Robinson's use of realism in the novels:

> Verging at times upon non-fiction, one of the reasons why his *Mars* trilogy has become such a consequential work is its acute correspondence with a likely reality, where the importance of both survival and moral vision is equally stressed. With this narrative, Robinson has moved SF into new territory: an experimental meta-reality, blending the precision of a mathematical model with the study of ideas, concepts, and beliefs into an autonomous matrix capable of evolution and mutation. (156)

Kerslake's description of Robinson's work – "blending the precision of a mathematical model with the study of ideas, concepts, and beliefs" – matches both the goals and the methodology of scenario planning for climate change. Robinson's hard science edge operates like the computer models through which the qualitative storylines are run. Kerslake's biological metaphor is also interesting – her claim that Robinson's stories are capable of evolution and mutation points to the ways that Robinson these concepts figure as themes within the narrative as it suggests that Robinson's work somehow achieves the impression of unfolding independently of authorial intention.

Jameson, also making reference to mathematics and computers, argues that science and politics are inextricable in the *Mars* trilogy:

> If all of Mars is one gigantic laboratory…then it is a unique laboratory in which the variables can never be isolated in the ordinary way, but always coexist in a multiplicity which can scarcely be mastered by equations let alone by the computer itself. This means that whatever the scientific theme confronted – botany, biology, geology, physics, chemistry, astronomy – the projected solution to the imaginary problem will always involve the rehearsal of a specific kind of

> thinking to which we are not often accustomed, namely the grappling with what Althusser calls "complex overdetermined concrete situations" which he also very specifically associates with history and above all with politics. (AF 395)

Jameson's point is to praise Robinson for grappling with the social nature of the scientific enterprise and with the complex relationship between science and its subject, between observer and observed. Robinson's feat is never to oversimplify. In these novels, science is above all a social phenomenon, nature is a cultural phenomenon, and culture is a natural phenomenon. Jameson's insight here has significant relevance to thinking about climate change; indeed he describes precisely the difficulty in constructing emissions scenarios and climate projections. Climate change is a planetary engineering experiment, and it is a political issue as much as a scientific one.

In his own writing and in interviews, Robinson also cites Althusser to discuss the concept of ideology. In lectures that he delivered after the *Science in the Capital* trilogy, Robinson explains that he appreciates Althusser's definition of ideology -- "an imaginary relationship to a real situation" – because it takes ideology out of the realm of the pejorative. Robinson argues that ideology is necessary -- one needs a conceptual filter to understand reality. He explains ideology using the metaphor of a lens, or a pair of spectacles. What one wants out of an ideology, in this metaphor, is a wide view, free of blemishes, a lens that you might constantly re-grind (Google Tech Talks, December 11, 2007). The point is that it is impossible to operate without an ideology, and that therefore, one ought to be self-conscious of that ideology, to take some active and critical part in its construction. There is a connection to be made between Althusser's notion of

ideology and Kuhn's conception of scientific paradigms.[26] Robinson points towards this connection in the *Science in the Capital* trilogy, alluding to and directly citing Althusser and Kuhn at different moments within the plot. These allusions argue that climate change presents a paradigm shift in science that necessitates an ideological shift in politics and culture.

The *Mars* trilogy is so often praised for its realism – both the accuracy with which Robinson depicts the Martian landscape and the conceptual richness of his thought experiment – that it can be possible to forget the ways in which the *Mars* trilogy operates as analogy. To do so overlooks the context of terrestrial climate change within which these novels were written. In his essay "Imagining Abrupt Climate Change: Terraforming Earth," Robinson writes, "Terraforming is climate change with a vengeance, and pretty early in writing my Mars books, while reading about the various environmental problems that were going to be caused by global warming, it occurred to me that we were already terraforming Earth, in the here and now, but by accident, and in ignorance of how it worked or what might happen" (1). Robinson's experiments with purposeful terraforming on Mars thus operate as analogy and critique, exposing the accidental terraforming that anthropogenic climate change produces on Earth, and suggesting an alternative form of ecological management. Robinson explains that "as I wrote my Mars novels it was always present in my mind that what I was describing as

[26] Kuhn and Althusser were both influenced by Gaston Bachelard's philosophy of science, particularly by his concept of epistemological rupture. Foucault's concept of the episteme, also influenced by Bachelard, is relevant as well, and probably comes closer to Althusser's ideology than to Kuhn's paradigm. Kuhn's scope is not so broad, nor his focus so materialist as Althusser and Foucault.

happening on Mars—the conscious and successful management of an entire planet's biosphere—might serve as a model for what we will have to do on Earth too" (2).

This analogical purpose is clear in the trilogy, and it is all the more powerful for the realism of Robinson's writing. In *Blue Mars*, during a diplomatic mission to Earth, Nirgal explains to the crowd,

> Mars is a mirror…in which Terra sees its own essence. The move to Mars was a purifying voyage, stripping away all but the most important things. What arrived in the end was Terran through and through. And what has happened since then has been an expression of Terran thought and Terran genes. And so, more than any material aid in scarce metals or new genetic strains, we can most help the home planet by serving as a way for you to see yourselves. As a way to map out an unimaginable immensity. Thus in our small way we do our part to create the great civilization that trembles on the brink of becoming. (Blue, 172)

Nirgal's assertion of Mars's significance for Earth at this literal level within the plot has a political resonance that rings true at a structural level for understanding the thought experiment of the entire trilogy.

Robert Markley argues that "Robinson uses the terraforming of Mars to rethink the complex relationships between planetary ecology, the interlocking systems that create and sustain the tenuous, seemingly miraculous conditions that allow life to flourish, and political economy, the distribution of scarce resources among competing populations and interests" (357). "Rather than utopian longings," Markley writes, Robinson's Mars trilogy "offers a carefully nuanced thought experiment in the greening of science, economics, and politics" (357). Here, Markley uses the phrase "utopian longings" in the

pejorative to mean impractical and idealistic, descriptive of an end-state rather than a process. Robinson's narrative, he suggests, is so complex and carefully thought out to seem plausible, self-critical enough to avoid the charge of being naïve. Robinson's novels are, in their nuance, another example of what Tom Moylan terms "critical utopia."

The model for Robinson's Martian economy is Herman Daly's eco-economics, mixed with something like David Schweickart's market socialism and Michael Albert's participatory economics.[27] We get an intimation of this economic experimentalism early in *Green Mars*, when Art Randolph attends a Praxis corporate retreat at which participants play various economic games. Praxis is a "metanational" corporation, but one with a sense of social responsibility and ecological limits. William Fort, the founder of Praxis, recognizes that the Terran economy is approaching a tipping point, and he is determined that Praxis should succeed within whatever system replaces it, even help to shape that system. At the retreat, Fort lectures on full-world economics, citing Herman Daly:

> now as Daly said, man-made capital and natural capital are not substitutable. This is obvious, but since most economists still say they *are* substitutable, it has to be insisted on. Put simply, you can't substitute more sawmills for fewer forest. If you're building a house you can juggle the number of power saws and carpenters, which means they're substitutable, but you can't build it with half the amount of

[27] See here, for example, Herman Daly's *For the Common Good* (1989) and his "Economics in a Full World," published in *Scientific American*, September 2005, Vol. 293, Issue 3. See David Schweickart's *Against Capitalism* (1993) and *After Capitalism* (2002). See also his "In Defense of Market Socialism" in *Market Socialism: A The Debate Among Socialists* (1998) and "Is Sustainable Capitalism an Oxymoron?" in *Perspectives on Development and Technology*, Vol. 8, 2009. See also Michael Albert's *Parecon: Life After Capitalism* (2003).

> lumber, no matter how many saws or carpenters you have. Try it and you have a house of air. And that's where we live now. (Green 77)

Fort's insight here about natural capital, which is the foundational insight of eco-economics, presents a challenge to classical economic models, both capitalist and Marxist. One could argue that the very idea of "natural capital" is itself a kind of category mistake, a contradiction in terms that attempts to quantify an unquantifiable ecosystem service, but this argument further proves the point, which is that ecosystem services are not adequately accounted for within the framework of classic economic models.

Notably, scenario thinking and computer modeling are both explicitly troped in the novels. The "games" that William Fort has the participants play at the Praxis corporate retreat are exercises in modeling the future:

> The first game Fort wanted to play involved estimating maximum sustainable human populations. "Doesn't that depend on assumptions about lifestyle?" Sam asked.
>
> "We'll make a whole range of assumptions."
>
> He wasn't kidding. They went from scenarios in which Earth's every acre of arable land was farmed with maximum efficiency, to scenarios involving a return to hunting and gathering, from universal conspicuous consumption to universal subsistence diets. Their lecterns set the initial conditions and then they tapped away, looking bored or nervous or impatient or absorbed, using formulas provided by the table, or else supplying some of their own.

It occupied them until lunch, and then all afternoon. Art enjoyed games, and he and Amy always finished well ahead of the others. Their results for a maximum sustainable population ranged from a hundred million (the "immortal tiger" model, as Fort called it) to thirty billion (the "ant farm" model).

"That's a big range," Sam noted.

Fort nodded, and eyed them patiently.

"But if you look only at models with the most realistic conditions," Art said, "you usually get between three and eight billion."

"And the current population is about twelve billion," Fort said. "So, say we're overshot. Now what do we do about that? We've got companies to run, after all. Business isn't going to stop because there's too many people. Full-world economics isn't the end of economics, it's just the end of business as usual. I want Praxis to be ahead of the curve on this…. Tomorrow we'll play a game called Overfull." (Green 79)

The point of these games is to shake up the thinking of the attendees – to help them think outside their commonplace conceptual scheme. The important thing is not predicting the future precisely, but having the imaginative wherewithal to think from a new perspective, to re-imagine the future in its possibility. We later learn that Art is being groomed to act as an emissary to Mars from Praxis. He travels to Mars, gets captured as a spy, wins the trust of the revolutionaries, and becomes an important voice in the construction of a new Martian constitution and economy. During the revolution, Praxis becomes a model for the kind of worker-owned corporate structure that facilitates the transition to a more just political-economic-ecological system.

Robinson also tropes more "scientific" versions of modeling. In *Green Mars*, Sax attends a scientific conference in Burroughs, where he reads about and reflects upon his own contributions to the Mars terraforming project at a poster session:

> When Sax had been made head of the terraforming project in 2042, he had immediately initiated the construction of factories to produce and release into the atmosphere a special greenhouse gas mix, composed mostly of carbon tetrafluoride, hexafluoroethane, and sulphur hexafluoride, along with some methane and nitrous oxide. The poster referred to this mix as the "Russell Cocktail," which is what his Echus Overlook team had called it in the old days. The halocarbons in the cocktail were powerful greenhouse gases, and the best thing about them was that they absorbed outgoing planetary radiation at the 8-to 12-micron wavelength, the so-called "window" where neither water vapor nor CO2 had much absorptive ability. This window, when open, had allowed fantastic amounts of heat to escape back into space, and Sax had decided early on to attempt to close it, by releasing enough of the cocktail so that it would form ten or twenty parts per million of the atmosphere, following the classic early modeling on the subject by McKay *et al.* So from 2042 on, a major effort had been put into building automated factories, scattered all over the planet, to process the gases from local sources of carbon and sulphur and fluorite, and then release them into the atmosphere. (Green, 203-204)

Robinson's account of terraforming in this passage operates on several registers. On the literal level, his explanation of the specific effects of various greenhouse gases offers a nuanced understanding of atmospheric physics. On the figurative level, Robinson's

description of the "automated factories" built for the purpose of putting greenhouse gases into the atmosphere estranges industrial factories on Earth built for other purposes but with the same effect. Finally, in terms of futures thinking, and in contrast to the purpose of the scenario exercises that Fort has his employees play, which is to provoke fresh insights through a shift in perspective, the purpose of the computer modeling is to predict the future consequences of present actions. Sax thinks, "There was something so comforting about simple physics" (204). And here Sax's comment reads ironically; on the one hand because it points to the fact that the still debated theory of anthropogenic climate change makes sense at the level of simple physics; on the other hand because the "simple physics" of terraforming Mars requires such complex political negotiations to enact.

While the terraforming of Mars operates in the foreground, climate change on Earth operates in the background of the *Mars* trilogy, as a part of a more general ecosystem decline. At the literal level, Mars is a safety valve for an overpopulated Earth. When Zo visits Earth in *Blue Mars*, she describes it as "Steaming, clotted, infectious, a human anthill stuck with a stick; the panic pullulation ongoing in the dreadful mash of history; the hypermalthusian nightmare at its worst; hot, humid, and heavy" (Blue 498). The revolution on Mars depends upon this ecological crisis on Earth. Though not the result of global warming, the trigger event in the Mars trilogy looks similar to climate change scenarios emphasizing the possibility of sea-level rise --the West Antarctic Ice Sheet becomes unstable, in this scenario because of volcanic activity, and breaks off into the ocean, causing sea levels around the world to rise dramatically. The resulting

catastrophe causes a political distraction on Earth that allows the Martian colonists to get away with their second revolution.

Frederick Buell finds this literal reading of Robinson's *Mars* trilogy troubling. He writes, "Robinson's off-world utopia does not provide a model for earthly ecological reconstruction; instead, it quite literally embraces the notion that earthly ecosystems and society are a lost cause. Robinson's novels thus subtly undercut, rather than inspire, contemporary efforts at reconstructing environments and repairing damaged ecologies" (279). Buell memorably describes the Mars trilogy a "marvelously, baroquely imagined mousehole for popular fantasy in flight from the present degradation of the Earth" (279). Buell's reading misses the analogical dimensions of the Mars trilogy, but there remains something to be said for his insistence upon this literal analysis. As thoroughly as Robinson tries to fill Utopus's trench, these stories seem to require their otherworldly setting to enact the radical alternatives that they present, and to that extent they remain impractical.

With the *Science in the Capital* trilogy, Robinson attempts to resolve this literal disconnect, turning his focus to Earth, to the United States, and to the near future, writing "a domestic comedy about global catastrophe—and how we might avoid it, or even counter it when it starts" (IACC, 17). In contrast to the gradual climate change that takes place in the *Mars* trilogy, the *Science in the Capital* trilogy imagines an abrupt climate change scenario, triggered by anthropogenic global warming. Citing the work of Richard Alley and the committee of scientists from the National Research Council who published the first book on the subject in 2002, Robinson describes the study of abrupt climate change as a paradigm shift within climatology. He explains the history of the Greenland

ice-coring project and its revelations about Earth's climate during the Younger Dryas, and he positions abrupt climate change as an extension of the 19th century debates about "gradualism" and "catastrophism" in geology. Robinson presents a conceptual framework for being able to understand abrupt climate change that includes new developments in the study of climatology more generally -- chaos theory in meteorology, supercomputers and advanced modeling capabilities, Euler's work on non-linear dynamics, and new information in the paleo-record (IACC, 11). For Robinson, as a novelist, perhaps the most significant characteristic of abrupt climate change is that "geologic timescales become individual timescales; and so, novelistic timescales" (IACC, 13).

It is noteworthy that Robinson's two trilogies map onto the difference between pre- and post- 9/11 environmentalism outlined in earlier chapters. The *Mars* trilogy includes three revolutions – two violent. The *Science in the Capital* trilogy does not describe a violent revolution. Instead it describes a peaceful transition toward a more equitable future, led by the United States. It imagines voting as a sufficient force to change the political landscape. The *Mars* trilogy is heavily invested in depicting a radical environmental politics, from MarsFirst! to the Reds and the Greens, while the *Science in the Capital* trilogy seems to avoid any mention of radical environmentalism. There is not even a Green party in the *Science in the Capital* trilogy; electing a Democrat is sufficiently radical to save the world.

In the climate change trilogy, then, Robinson's ambitions seem somewhat less epic than in his *Mars* trilogy. The time frame is considerably shorter. There are fewer characters. There is not the same kind of new beginning; there is not the same degree of

reconstruction; it is not so concerned with the uncanny phenomenology of living on another planet. The *Science in the Capital* series is as concerned with the joys and difficulties of being a stay-at-home dad as it is with solving the environmental crisis of abrupt climate change. And yet, in its concern with these aspects of contemporary life, Robinson's trilogy aims to be practical and practicable – it operates as a kind of handbook to ethical lifestyle alternatives for the American middle-class citizen.

Robinson traveled to Antarctica under NSF sponsorship in 1995 as a part of their Antarctic Artists and Writers program. *Antarctica* (1997), the novel that he wrote as a culmination of that experience, introduces several characters who reappear in the *Science in the Capital* trilogy, in particular Senator Phil Chase and his advisor, Wade Norton. *Antarctica* operates within its own genre, and belongs alongside the other literature of that icy continent, such as Apsley Cherry Garrard's *The Worst Journey in the World* (1922), to which Robinson makes regular reference. And yet, set as it is in the near-future, *Antarctica* cannot help but register the effects of climate change on the sensitive poles, and discussions of climate change come up occasionally between the characters in the novel, even when their focus is elsewhere. The time Robinson spent in Antarctica researching the novel gave him access to scientists working on climate change and opportunity to talk with them about the mechanism for "abrupt" climate change in his next trilogy. His affiliation with the NSF also gave him a level of insight into that organization that inspired his focus in the *Science in the Capital* trilogy.

Describing his purpose in writing the *Science in the Capital* trilogy, Robinson writes, "I wanted to describe what the experience of abrupt climate change would feel like, from the point of view of a number of individuals. I wanted also to describe how

science works in the real world, today, and how it relates to the worlds of power politics, capital, and daily life. I wanted to explore some ideas about how certain Buddhist concepts might apply to the situation, and help us think our way through it" (IACC, 16). Robinson focuses on the NSF as an institution that could become activated as a change agent in tackling climate change. Robinson quips, "Of course valorizing science and the NSF as one of its central institutions brings certain comic aspects to the fore, because, for a world-saving hero, NSF is fairly small, with a limited assignment in the federal array of bureaucracies; but as we have learned from climatology, sometimes small actions can have big effects, and the position of the NSF, at the intersection of science and government, seemed strategically full of potential" (IACC, 17). Robinson means at least two things with this assertion – the NSF is strategically full of potential for a novelist looking to talk about the intersection of science and politics, and, as the plot of Robinson's trilogy demonstrates, the NSF is strategically full of potential as a governmental organization that might influence policy more directly than it currently does.

Forty Signs of Rain (2004) introduces the central characters and ideas that will be elaborated in the trilogy, as well as some of the supporting characters. We meet the Quiblers, Anna and Charlie, Nick and Joe. We meet the Khembalis, Drepung and Rudra Cakrin. Most of all we meet Frank Vanderwal. *Forty Signs of Rain* is concerned with explaining how scientific peer-review works – one of the major events in this novel is an NSF review board meeting where the board decides which grant proposals to fund. Similarly, Robinson begins to map out the intersection of science and capital as he describes a meeting between the biotech start-up Torry Pines Generique and a venture

capitalist firm interested in their algorithms. Finally, this novel is concerned with the ways that science might change -- near the end of the novel, for example, Rudra Cakrin gives a lecture at the NSF on "The Purpose of Science from a Buddhist Perspective." *Forty Signs of Rain* is also educative in terms of politics. Robinson describes the process of hiring a lobbyist and meeting with a senator. Later, we read about environmental legislation making its way through Congress – we see a bill get written, revised, and chopped up in Congress. One of the more humorous scenes in the novel takes place when Charlie Quibler meets the President and his science advisor, Dr. Strengloft, with Joe on his back.

After *Forty Signs of Rain*, Robinson published *Fifty Degrees Below* (2005) and *Sixty Days and Counting* (2007). Thematically, these novels are largely concerned with a presidential transition of power and the potential for systemic change that comes with it. Published in the years leading up to the 2008 presidential elections, they are positioned to engage contemporaneous public and political discourse on climate change. The title of the final novel refers to the first sixty days of the new presidential administration, and the novel models one set of policy shifts that might effectively confront the challenge of climate change. Robinson's novels are educative – they attempt to demystify both the peer-review process and the legislative process for the public. They also explore the relationship between the public and the private sphere and the role of industry and technology. They aim at a civic scientific literacy. Robinson also makes a conscious attempt to place himself in the tradition of American environmental literature. His protagonists read Thoreau and Emerson quotations on internet websites, and he presents ecological footprint measurements and carbon calculators as a kind of

contemporary Thoreauvian accounting. Characteristically, Robinson illuminates alternative economies and social arrangements in these novels, but more clearly than his speculations in the *Mars* trilogy, Robinson's *Science in the Capital* trilogy, set in an alternate present, emphasizes utopian experiments already in existence. Arguably then, Robinson shifts generic modes, blurring the line between utopia and manifesto.

Roger Luckhurst describes the aesthetic of *Science in the Capital* as *proleptic realism* – "a modeling of the present day tilted five minutes into the future." (172) Luckhurst points out that the *Science in the Capital* trilogy raises interesting questions about its genre status. He explains that "the series exists in a curious transitional space between fact and fiction, accumulated evidence and future modeling, and in a contested arena where research proposals, empirical findings, market reports, science popularization, political strategy documents and science fiction can become very hard to distinguish from each other, since climate change discourse across the board must use prolepsis" (171-172). Luckhurst's insight here points to the ways in which climate change discourse is informed by the narrative techniques of science fiction. This is a point about method rather than content. Luckhurst also notes the difference between the *Mars* trilogy and the *Science in the Capital* trilogy: "The radical thrust for reinvigorating the American polity comes not from the Marxian eco-economics of the Mars series, but impassioned speeches about the legacy of Abraham Lincoln or FDR's 'bold and persistent experiment' of the New deal. We are in a compromised and pragmatic utopia – something like *The West Wing*'s alternative presidency to the neoliberal hegemony of the Clintons and Bushes" (170).

Luckhurst's sense that this series is a "pragmatic utopia" is certainly accurate. His description of that utopia as "compromised" is more debatable, but it points to a sense that Robinson has moderated his views within this series. Nonetheless, Luckhurst goes on to praise the series in terms of both its critical and its architectural functions. Luckhurst points to Lukacs's *Theory of the Novel* to explain Robinson's use of realism as a mode of political writing that attempts to capture the contradictions inherent in modern society: "Science in the Capital aims to describe if not a complete totality then at the very least a complex matrix of institutional forces that lie at the heart of the American political machine. Against the immense inertia of the forces controlling this matrix, Robinson engineers a plot that sets about redirecting its energies away from the cycle of destructive neo-liberal denial and towards a productive, ecologised capitalism. The books, in effect, construct a counter-hegemony out of actually existing elements of the American polity, and in a decidedly pragmatic rather than utopian mode" (172). In its pragmatism, Robinson's trilogy matches the political climate within which it was published. The presidential campaign of Senator Barack Obama, a utopian project in its own right, and a point of comparison for Robinson's imaginary candidate Phil Chase, built its platform upon a similar foundation of political pragmatism.

Robinson's trilogy maps out the history of science, environmentalism, and politics over the last half century. Characters in the novel do historical research on the history of the NSF -- Diane Chang and Frank Vanderwal, largely through internet searches, discover what Luckhurst describes as a "thirty year development of antiscientific Republicanism that began with Richard Nixon's temporary abolition of the role of scientific advisor to the president and the expulsion of the National Science

Foundation from the buildings adjacent to the White House in 1973" (173). It could be argued that these internet searches invite the reader to conduct similar research – in effect, they model and invite popular research methods. As such, they stand in contrast to Michael Crichton's *State of Fear*, which operates as a self-contained document – in Crichton's novel, all the research the reader might need is identified within the novel itself, fully referenced at the end.

Towards the end of *Forty Signs of Rain*, Diane Chang calls Frank in to explain to the NSF board members his recommendations for how the NSF could be more effective in tackling climate change issues. Frank's presentation amounts to a manifesto. His recommendations include stimulating synergistic efforts across the disciplines to work on climate change issues, looking for immediately relevant applications from already funded projects, and commissioning new work on important projects. He also argues that they should assign:

> up to fifty percent of NSF's budget every year to the biggest outstanding problem you can identify, in this case catastrophic climate change, and direct the scientific community to attack and solve it. Both public and private science, the whole culture. The effort could be funded by something like Germany's Max Planck Institutes, which are funded by the government to go after particular problems. There's about a dozen of them, and they exist while they're needed and get disbanded when they're not. It's a good model. (Forty 321)

Frank's utopian vision for the NSF is motivated by specific concrete examples. It is, as Luckhurst suggests, a pragmatic vision. It is also, even within the context of the plot, a radical proposal. Frank's suggestions take the board by surprise – he seems to say what

they have been thinking, but what they have been too fearful or cynical to believe possible.

Frank argues that "you should make more efforts to increase the power of science in policy decisions everywhere. Organize all the scientific bodies on Earth into one large body, a kind of UN of scientific organizations, which would then work together on the important issues, and would collectively *insist* they be funded, for the sake of all the future generations of humanity" (Forty 321). Recognizing that this line of argumentation might seem initially anti-democratic, Frank argues that instead, the board should think of it as a paradigm shift in the way that science interacts with society. Rehearsing Kuhn's theory of paradigm shifts, Frank then facilitates a brainstorming session in which everyone offers ideas that break from the status quo. As the scene goes on, Frank explains the necessity of politicized science:

> "The thing is…the way we have things organized now, scientists keep themselves out of political policy decisions in the same way that the military keeps itself out of civilian affairs. That comes out of World War Two, when science *was* part of the military. Scientists recused themselves from policy decisions, and a structure was formed that created civilian control of science, so to speak.
>
> "But I say to hell with that! Science isn't like the military. It's the solution, not the problem. And so it has to *insist on itself*. That's what looks wild about these ideas, that scientists should take a stand and become a part of the political decision making process. If it were the folks in the Pentagon saying that, I would agree there would be reason to worry, although they do it all the time.

> What I'm saying is that it's a *perfectly legitimate move for us to make*, even a necessary move, because we are not the military, we are already civilians, and we have the only methods there are to deal with these global environmental problems." (Forty, 325)

Luckhurst explains that "in proposing to overturn the strategy of apparently preserving scientific 'objectivity' by refusing to engage in everyday politics, Frank advocates abandoning the position taken by the scientific establishment since Nixon's punishment for Democrat-advocacy in 1964. This strategy has resolutely failed in the face of the ideological use of 'sound science' by Republicans in the 1990s" (175). Frank asks the scientific community to embrace its own politics -- the scientific community ought to organize, and use its political power. This is where the radical politics of the *Science in the Capital* trilogy appears. Climate change is inevitably political – it is impossible to take an apolitical position on the subject. In contrast to Crichton's essay on "Why Politicized Science is Dangerous," Robinson's trilogy might be thought of as a treatise on why politicized science is inevitable, and therefore worthy of critical engagement. In an interview with Terry Bisson in 2009, Robinson explains the radical scientific politics of climate change:

> What's been set up and is playing out now is a Huge World Historical Battle between science and capitalism. Science is insisting more emphatically every day that this [climate change] is a real and present danger. Capitalism is saying that it isn't, because if it were true it would mean more government control of economies, more social justice (as a climate stabilization technique) and so on. These are the two big players in our civilization, so I say, be aware, watch the

> heavyweights go at it, and back science every chance you get. I speak to all fellow leftists around the world: science is now a leftism, and thank God; but capitalism is very very strong. So it's a dangerous moment. People who like their history dramatic and non-utopian should be pleased. (Interview, 101)

Robinson's assertion that "science is now a leftism" lends credence to the critique from the other end of the political spectrum that climate science has a liberal political agenda. Indeed, Robinson's assertion accepts these criticisms as true, but argues for them as a positive aspect of climate science, rather than a deficiency. Robinson's trilogy asks science to consider its political implications more carefully, to embrace the ways in which it has political significance.[28]

Roger Luckhurst points to Bruno Latour's *Science in Action* (1987) as a framework for understanding Robinson's portrayal of climate change. Luckhurst explains that "climate change is what Latour calls a *tangled object*, uncertainly located between nature and culture…and thus lying confusingly between object and subject, fact and artifact, and so has inherent disputations" (176). Luckhurst describes *The Science in the Capital* trilogy as "a Latourian manifesto for re-mapping the matrix of heterogeneous sources of power to accept the findings of climate science, countering the brilliant ideological exploitation of networks that has been demonstrated by the Right in blocking the facts of climate change" (176). Luckhurst's reading is insightful on a couple of levels. Its insight about climate change – that it is both natural and cultural, fact and artifact – echoes Jameson's claim about terraforming in the *Mars* trilogy. Latour's notion

[28] Frank's position here echoes the mission of the Union of Concerned Scientists. The Union of Concerned Scientists was founded in 1969 at MIT, calling for greater emphasis on applying science to pressing social and environmental problems rather than military programs.

of the *tangled object* thus has some correspondence to Althusser's *complex overdetermined concrete situations.* Luckhurst's further insight that Robinson's trilogy is a manifesto has implications for its status as within utopian fiction. Once again, it points to the pragmatism of the series and its contemporary relevance, emphasizing the utopian possibilities already in existence, calling them into the spotlight as a model for change.

Luckhurst argues that the anger of the *Science in the Capital* series is driven by the context of ideological neo-conservative skepticism about climate change, but that ultimately, Robinson is "less interested in mapping the contours of what George Monbiot calls the 'denial industry' and more committed to tracing out the alliances and connections needed for a counter strike to establish science at the core of Washington decision making" (174). This is the way in which Robinson's novels act as manifesto. Luckhurst explains that "Robinson uses clusters of characters to explain how science is done along the line from the outlying small laboratory to the White House advisory staff" (174). As points on the map, Luckhurst identifies Torrey Pines Generique, the biotech start-up in San Diego; Anna Quibler, a section head of the NSF and the "model of a quantitative scientist;" Diane Chang, the head of the NSF who becomes President Chase's science advisor and whose "trajectory oversees the return of the NSF from an organization long marginalized by Nixon into the lynch pin of federal and global mitigation projects;" and Charlie Quibler, a part time environmental policy advisor to Senator Chase who reluctantly becomes a full-time staffer to the President. In his new position Charlie "can now coordinate large-scale mitigations and lecture the neo-conservatives of the World Bank about their rapacity, realizing with a shock that he has the power to decapitate its obstructive leadership" (174). Each of these characters, both

in their own actions and through their connections with other characters, models ways that individuals might become more effective in confronting climate change. They give the reader a sense of the structural power of the positions that they hold while retaining a sense of the individual holding those positions.

In "Living Thought: Genes, Genres and Utopia in the Science in the Capital Trilogy," Gib Prettyman focuses on Robinson's playful use of genre. Prettyman argues that Robinson's trilogy "presents a genetic conception of genres and their role in human life, both historical and potential" (182). Here we might remember Patricia Kerslake's assertion that the *Mars* trilogy is capable of mutation, of evolution. Prettyman argues that the series "represents genres, and indeed all human thought and culture, as living and evolving expressions of material…at once imaginative and material categories, complex material encodings of lived human experience, in short, 'living thought'" (182). Within this framework, Robinson's trilogy "raises the possibility of modifying genres to express therapeutic restructuring of life under late capitalism" (182). Prettyman argues for both etymological and analogical connections between genes and genres:

> Genre is thus at heart a biological metaphor, and Robinson's novels literalize that biological perspective through such thematic topics as biotechnology and genetic modification, sociobiology and evolutionary psychology, ecology and environmentalism, and new disciplines such as bioinformatics. Genres and other habitual forms of thought are related to biological and ecological processes both analogically and literally, allowing genres to be explored for their genetic function in social organisms. These thematic insights are also reinscribed into the novels as generic experiments with the narrative itself, in a process we could think of as

> Robinson's generic modifications. Both types of experiment – with thematic connections and with narrative form – serve as political allegories for the material transformations in thought and habit necessary for a revolutionary break from late capitalism. Arguably, they also serve as direct political actions in the form of "bold and persistent experimentation" with contemporary forms of "living thought." (185)

We might look here to the ways that Robinson's novels are explicitly concerned with their own literary and cultural inheritance. In *Antarctica* the importance of narrative is evident in the ways that the contemporary expeditions rely upon accounts of the past as they travel the frozen continent. For the characters in that novel, Apsley Cherry-Garrard's account of Scott's expedition to the pole is more than just literature; it is a guidebook. In the *Science in the Capital* series, we get a sense of this material value of literature primarily through the character of Frank Vanderwal, who reads Emerson, Thoreau, and Laura Ingalls Wilder while he camps in Rock Creek park through the winter. Prettyman cites an interview in which Robinson claimed that he wants his books to "have it both ways" – to "'stand as modernist novels' and also be 'read by lab techs who have no training in literature'" (184). Frank's character, whose entry into 19th century American literature comes through discovering "Emerson for the Day" on the internet, models a version of this imagined audience, while Robinson's descriptions of the natural landscape often enter a descriptive mode reminiscent of 19th century nature writing.

Prettyman also points to the utopian formal experimentation taking place at the characterological level: "each plotline explores how concrete or even mundane actions –

the ongoing 'good work' beneath the dystopian 'nightmare' of capitalist macro-political history – can potentially lead to systematic transformations. Specifically, they imagine modifying structures of habitual thought such that new social organisms would be expressed, with the goal of a sustainable social and material ecology designated 'permaculture'" (187). Robinson's novels are at once a laboratory and a handbook, and this is how we might understand the emphasis on each character's lifestyle – in particular, the lifestyles and homestyles of the Quibler family and Frank Vanderwal, and less centrally, the lifestyles and the shifting domestic sphere of the Khembalis. Robinson presents small modifications to the domestic sphere with the aim of describing a set of lifestyle possibilities that maximize happiness at the same time as they work towards minimizing environmental harm. He achieves this effect through formal shifts and modifications of expectations – for example, Charlie's character resists gender expectations in his decision to stay at home with his son during the day. Robinson explores uncommon modes of middle-class life in the common details of Charlie's days with Joe, his internal wrestling with decisions about the requirements of his career and his desire to spend time with his children. In another example, Anna researches carbon calculators, and the Quiblers make family decisions about altering their energy consumption and lifestyle in order to reduce their carbon footprint. Decisions about how to change habitual forms of behavior are explicitly examined within the plot. Frank's decision to live in Rock Creek park is not directly motivated by carbon calculations, but it is another way for Robinson to illuminate alternative lifestyles with smaller footprints. Through Frank, we are introduced to a group of homeless veterans who live in the park as well as to a group of Freegans who squat in abandoned buildings and host potluck feasts.

Frank's character, more than any other, moves between different groups, offering the reader entry into multiple lifestyles and ways of being in the early 21st century.

Throughout the trilogy Robinson narrates most often from Frank Vanderwal's point of view in free indirect discourse. Frank is a sociobiologist in his middle forties, a reluctant academic, and always just a little outside of his element. Frank is a kind of comic-romantic action hero -- just athletic enough to be involved in the action, but clumsy enough that he's usually lucky to get out alive. Roger Luckhurst calls him "an impressively weird creation" (177). He tracks Frank's development from a "reductive sociobiologist" who rationalizes "modern human behavior through evolutionary speculations confidently delivered as fact" through his experiment in Rock Creek Park with "repaleolithization" to his broken nose and subdural hematoma, which cause problems with decision making, to his eventual marriage to Caroline at the resolution of the trilogy. According to Luckhurst's analysis of Frank, "At the characterological level then, Science in the Capital seems to suggest that optimodality is the subjectivity of a time of crisis, but that the readjustment of nature and culture that comes from a committed ecological politics will allow a more holistic sense of self to emerge" (178). Responding to charges that realism imposes formal closure that seems to circumscribe the ideological limits of character action, Luckhurst argues that "Proleptic Realism…cannot offer closure, hovering as it does in a finally indeterminable near future where the modeling of reality remains fundamentally incomplete…. Character can never be complete, but the radical pressures on coherent subjectivity demonstrated in Robinson's portrayal of Frank gives us a concrete determination of the forces in play" (178).

Prettyman describes Robinson's depiction of Frank's lifestyle experiments as a modification of the "Robinsonade" – "the archetypal story of Robinson Crusoe. As Prettyman explains, "Defoe's fantasy is…one of a fortunate crisis providing a radical escape from the restrictions of conventional society and enabling a technocratic dream of socioeconomic reinvention" (193). Prettyman correctly reads *Robinson Crusoe* as a utopian story – "a foundational break from existing society, a reinvention along new material and ideological lines, a thought experiment or fantasy about a rational reconstruction of life" (193). It is more instructive, however, to place Frank's experiment in the park within an American literary context. In particular, *Fifty Degrees Below* and the first part of *Sixty Days and Counting*, with their focus on Frank's lifestyle experiments and his trip to Maine, stand as contemporary adaptations of *Walden* and *The Maine Woods.* Robinson is explicitly interested in creating this connection to an American literary heritage. Frank discovers "Emerson for the Day" on the internet, and in his tent during the harsh winter, he reads Laura Ingalls Wilder's *The Long Winter*. Frank describes it as "a real beauty, the story of a small Dakota town surviving the extreme winter of 1880. The town had lost all contact with the rest of humanity, cut off by huge snowpacks from October to May. Talk about island refugia!" (Fifty 434). The site where the homeless veterans sleep becomes known as "Sleepy Hollow." In the passage where Frank discovers "Emerson for the Day" we get a sense of the ways that Robinson plays with these literary affiliations:

> Recline on his groundpad, then, in the open doorway of his tent. Only when it was windy did he retreat fully inside. As long as the air remained still, his heavy sleeping bag had kept him warm on climbs in Alaska and the Canadian

Arctic; it would do the same here. And the nights were too beautiful to miss. The highest branches spiked around him like a forest of giant thorns, the stars brilliant through their black calligraphy. He watched the stars, and read his laptop, or a paperback set under the lantern, until sleep came on him; then snuggled into the bag; slept well; woke serene, to the sight of treetops bobbing and rustling on the dawn breeze. Lines of blackbirds flew out of town to look for food, under a flat sky of pewter and lead. Really the important thing was to be out in the world, to feel the wind and see the full spaciousness of being on a planet whirling through space. A feeling of beatitude; was that the right word? Sit up, click on the laptop, google "beatitude"; then, there on the screen:

> "**beatitude** dips from on high down on us and we *see.* It is not in us so much as we are in it. If the air come to our lunges, we breathe and live; if not, we die. If the light come to our eyes, we see; else not. And if truth come to our mind we suddenly expand to its dimensions, as if we grow to worlds."

My. Ralph Waldo Emerson, from a website called Emersonfortheday.net. Frank read a little more: quite amazing stuff. He bookmarked the site, which apparently featured a new thought from the philosopher's writings every few days. Earlier samples read like some miraculously profound horoscope or fortune cookie. Reading them, Frank suddenly realized that the people who had lived before him in this immense hardwood forest had had epiphanies much like his. Emerson, the great Transcendentalist, had already sketched the parameters or the route to a new kind of nature-worshipping religion. His journal entries in

> particular suited Frank's late night go-to-sleep reading, for they had the feel of someone thinking on the page. This was a good person to know about. (Fifty 334-335)

In the first part of this passage, Robinson's depiction of Frank's internal monologue mimics a descriptive style that might be said to typify American nature writing in the 19th and 20th centuries – full of metaphor and a Romantic sense of nature as transcendent and rejuvenating. Then Robinson breaks into a distinctively 21st century mode, with Frank looking up the word "beatitude" on the internet and discovering Emerson. As a representation of postmodern thought, there is the appearance of a radical contingency in this passage – a stochastic disruption in an otherwise continuous stream of thought. Robinson mixes high and low art in this passage, calls attention to the fact that the language he uses possesses a distinctive literary heritage. "Beatitude" – the word that Frank is self-conscious about using correctly, finds its most appropriate, if apparently random, definition in Emerson's use of the word. Frank amusingly describes Emerson as a "miraculously profound horoscope or fortune cookie" at the same time as he proclaims value in the insights of those "who had lived before him in this immense hardwood forest." The website Emersonfortheday.net does not exist, but since the publication of Robinson's trilogy, a reader and fan of Robinson's work has created a website called Emersonfortheday.com.

Frank's discovery of Emerson leads to his discovery of Thoreau as well. Frank describes Thoreau as "the great philosopher of the forest at the edge of town, and as such extremely useful to Frank—often more so, dare he say it, than the old man himself" (Sixty, 15). *Fifty Degrees Below* recounts Frank's experiment in going feral, moving out

of his apartment and building a treehouse, while *Sixty Days and Counting* follows him into the Khembalis' farm, where he helps to construct another treehouse, as well as following him on his journey to Maine to find Caroline. Frank moves into Rock Creek Park along with the animals from the National Zoo who have been displaced by the flood. In addition to this ecological community, Frank befriends a group of homeless veterans. He also meets other homeless characters who reappear throughout the series – Chessman, a younger man who the others seem to watch over, and a woman who is trying to stay sober, counting days. During the harsh winter, Frank becomes known as "Johnny Appletent" as he helps the homeless men at site 21 fix their campfire so that it provides better heat. Later he begins distributing tarps and surplus down jackets around town to homeless people trying to stay warm.

In certain aspects, Frank's attitude towards the veterans in the park resembles Thoreau's attitude towards the poor. In *Walden*, Thoreau quips, "There are those who have used all their arts to persuade me to undertake the support of some poor family in town…. However when I have thought to indulge myself in this respect, and lay their heaven under an obligation by maintaining certain poor persons in all respects as comfortably as I maintain myself, and have even ventured so far as to make them the offer, they have one and all unhesitatingly preferred to remain poor" (69). Frank expresses a similar impatience when he examines the shelters that the homeless veterans have constructed:

> They had actually built the little shelters Zeno had proposed, Frank saw, in the dip they now called Sleepy Hollow, just to the west of the site. Some of them were already tucked into their low shelters, staring out red-eyed at the fire and the

> snowflakes. Cardboard, trashbags, branches, sheets of plywood, drop cloths, two-by-fours, cinder blocks: under that, dirty nylon or even cotton sleeping bags, toeing into snowbanks. You needed a groundpad under a sleeping bag for it to work.
>
> Frank found himself vaguely annoyed. Living like rats when they didn't have to; it was incompetent. Even if it was all they could find to build with. (Fifty, 342)

While this kind of pick-yourself-up-by-the-bootstraps mentality forms a mainstay of arguments against government-supported social policies, Frank's exasperation comes from a different kind of hard-edged care. Living outdoors himself, Frank is most concerned with the practical possibilities for staying warm. Frank rejects the idea that the homeless need to fall victim to the cold, and to this extent, his expectations constitute a form of empowerment. Thoreau's cynicism towards philanthropy and his somewhat distasteful sense of self-righteousness derive from a similar sense that he is comfortable with a simplicity that is perceived by others as too austere to emulate. Frank's attitude resembles Thoreau's cynicism, but Robinson's portrayal of Frank's relationship to the homeless veterans is more complex. We might read this as another of Robinson's generic modifications, and as a consequence of Robinson's preference for the novel as a form. Frank's discussions with the veterans add voices that are absent from Thoreau's monologue. Unlike Thoreau, Frank is in community with the vets, and his care coincides with that community.

Frank's trip to the Maine woods happens early in *Sixty Days and Counting*. Frank travels to Maine in order to warn Caroline that she's probably being surveilled. Robinson describes Frank's drive northward like this:

> 95 kept on coming, and endless slot through endless forest, a grass sward and two concrete strips rolling on for mile after mile. Finally he came to Bangor, Maine, and turned right, driving over hills and across small rivers, then through the standard array of franchises in Ellsworth, including an immense Wal-Mart. During the night he had driven north into full winter; a thin blanket of dirty snow covered everything. He passed a completely shut-down tourist zone, the motels, lobster shacks, antique stores, and miniature golf courses all looking miserable under their load of ice and snow, all except the Christmas knickknack barn, which had a full parking lot and was bustling with festive shoppers. (Sixty, 65)

Considered in contrast to Thoreau's travels, there is considerable irony in Robinson's depiction of Frank's trip to Maine. In contrast to Romantic nature writing, Frank's account of strip malls and tourist kitsch gives articulation to a particularly contemporary experience of the New England landscape. Frank encounters older versions of that landscape only virtually. Frank travels to Mount Desert Island, which, he learns, once again by googling in a cybercafé, was where Fredric Church had "rusticated" in the 1840s, painting landscapes that helped to define the American wilderness movement. Church, Frank learns, "took offense at the clear-cut logging on the island, and worked to get the legislature of Maine to forbid it, in some of the nation's first environmental legislation. All this was happening at the same time as Emerson and Thoreau were writing. Something had been in the air" (Sixty, 66). Finally, in a way that links these

different times and modes of experience in the same place, Frank encounters the Maine landscape through physical endeavor as well, as he and Caroline attempt to outrun their pursuers by windsurfing on frozen lakes.

As mentioned, *Fifty Degrees Below* and *Sixty Days and Counting* were published in the years leading up to the 2008 Presidential elections in the United States. It is worth considering the way that these novels intervene in the political discourse around those elections. While there is no Green Party in the *Science and the Capital* trilogy, the role of the third party candidate does exist. In the middle of *Fifty Degrees Below*, the reader learns about the "Social Science Experiment in Electoral Politics" or SSEEP. According to Edgardo Alfonso's notes, SSEEP is "designed to ask, if the scientific community were to propose a platform of political goals based on scientific principles, how would it be formulated, and what would the platform say? In other words, what goals for improvement in society and government might follow logically from the aggregate of scientific findings and the application of the scientific method to the problem of change?" (Fifty, 319). Edgardo notes that the platform could take the form of something like the "Contract with America" adopted by the Republican Party before the 1994 election. The NSF decides to fund the experiment, and when research on the project begins, the SEEP candidate achieves an unexpected popularity. Describing the progress of Phil Chase's campaign for president, Robinson writes,

> One unexpected problem for his campaign was that the "Scientific Virtual Candidate" was polling pretty well, up to five percent in blue states, despite the fact that the candidate was nonexistent and would not appear on any ballots. And this of course was a problem for Phil. Most of those potential votes came from

> his natural constituency, and so it was accomplishing the usual third party disaster of undercutting precisely the major party most closely allied to its views. (Fifty, 546-547)

The Scientific Virtual Candidate performs the discursive function of a third party candidate, and even seems to have the same effect on the election itself. But in modifying the genre of the third party candidate, Robinson creates a loophole:

> The moment came in late September, when a hurricane veered north at the last minute and hammered New Jersey, New York, Long Island, and Connecticut, and to a lesser extent the rest of New England. These were blue states already, but with big SSEEP numbers as well, so that after the first week of emergencies had passed, and the flooding subsided, a SSEEP conference was held in which representatives of 167 scientific organizations debated what to do in as measured and scientific a manner as they could manage—which in the event meant a perfect storm of statistics, chaos theory, sociology, econometrics, mass psychology, ecology, cascade mathematics, poll theory, historiography, and climate modeling. At the end of which a statement was crafted, approved, and released, informing the public that the "Scientific Virtual Candidate" was withdrawing from all campaigns, and suggesting that any voters who had planned to vote for it consider voting for Phil Chase as being an "electable first approximation of the scientific candidate," and "best real current choice. Support for preferential or instant run-off voting method was also strongly recommended, as giving future scientific candidates the chance actually to win representation proportional to the votes they got, improving democracy if judged by representational metrics. (Fifty, 548)

The SSEEP candidate offers a metaphor for the political intervention of the entire trilogy. The SSEEP candidate operates as a utopian alternative to the candidates who are actually running. It performs the positive functions of a third party candidate, in terms of broadening the scope of political debate, without the negative consequence of taking votes away from the mainstream candidate who comes closest to the third party platform. At a structural level, Phil Chase (and the trilogy as a whole) operates as a kind of "Virtual Science-Fiction Candidate" in the lead up to the 2008 presidential elections. Phil Chase has no bearing on electoral politics, but he offers a low-stakes alternative with a practical agenda that might inform the debate, if not the policy decisions of the actual candidates. In this way, Robinson's novels are more explicitly policy relevant than the scenario documents produced by the IPCC; indeed, they are policy proscriptive.

The focus in *Sixty Days and Counting* is the first sixty days of Phil Chase's presidency and what a new administration could do to tackle climate change. Robinson makes regular reference to the First Hundred Days of FDR's administration – an analogy that also emerged in the media as President Barak Obama's administration came into power at the height of the financial crisis. In the novel, President Chase reverses the Nixon administration's exile of the NSF, and Diane Chang and Frank Vanderwal both move into the White House – Diane as the President's new science advisor, and Frank as Diane's advisor. Chase sets the White House up as a solar energy demonstration site, using every kind of solar technology available. After Phil and Diane meet in person, they fall in love and by the end of the novel decide to marry – a marriage of science and politics. Throughout this novel, Robinson reflects on the power of the presidency to

shape world politics. Through Charlie's reflections as advisor to the new president, Robinson suggests that:

> The president of the United States was many things, but unpowerful was not among them. Many of the administrations preceding Phil's had worked very hard to expand the powers of the executive branch beyond what the constitutional framers had intended—which campaigns made a mockery out of the "strict constitutionalist" talk put out by these same people when discussing what principles the Supreme Court's justices should hold, and showed they preferred a secretive executive dictatorship to democracy, especially if the president were a puppet installed by the interested parties. But never mind; the result of their labors was an apparatus of power that if properly understood and used could in many ways rule the world. Bizarre but true: the President of the United States could rule the world, both by direct fiat and by setting the agenda that everyone else had to follow or be damned. World ruler. Not really, of course, but it was about as close as anyone could get. (Sixty, 43)

Charlie's reflections are pragmatic – he seems to suggest that in the wrong hands, the office of the Presidency could do real damage, while in the right hands, it could do real good. And here we get a sense of the "compromised" utopia that Luckhurst describes. Charlie doesn't seem to think that it is a good thing that the President has so much power – his account of the way in which the office of the President achieved that power is a critical insight. And yet, the argument seems to go, since that power is there, good people ought to hold the office and use it to good ends. Prettyman argues that "Political heroism is another element of the American Experiment that Robinson reincorporates as

an altered genre…. Here again, the genre is necessarily modified in order to extract its utopian potential and neutralize its undesirable effects" (194). Prettyman identifies Abraham Lincoln and Franklin Roosevelt as the leaders from whom Robinson takes the most influence – leaders who used their power to create positive change in times of crisis. Prettyman also points out that by appealing to political heroes, Robinson engages a version of the "great man" story of history, a position he occupies with irony. Nonetheless, the utopian potential is clear – "combined with the catalyst of major crisis…political heroism and governmental politics provide another possible model for systemic change" (Prettyman, 194). As Chase explains to his team, "We got ourselves into this mess and we can get out of it. The problems create an opportunity to remake our relationship to nature, and create a new dispensation. So—happy days are here again! Because we're making history, we are *seizing* the planet's history, I say, and turning it to the good" (Sixty, 6).

One evolving voice of the novels is President Phil Chase's blog "Cut to the Chase." Chase's posts become a place for Robinson to experiment with idealistic global political-economic policies. From the President's blog in *Sixty Days and Counting*:

> Globalization has gotten far enough along that the tools are there to leverage the whole system in various ways. You could leverage it towards justice just as easily as you could leverage it towards extraction and exploitation. In fact it would be easier, because people would like it and support it. (Sixty, 464)

It is this sense that we inhabit a post-scarcity world that these novels insist upon. All of the resources that we need to solve the social problems of the planet are at hand; we just need to imagine how we could use them to better ends than personal profit. Phil Chase's

inauguration speech lays out a bold platform of international cooperation and social justice. Chase promises to "go to the United Nations and tell them that the United States is ready to join the international effort" (Sixty, 91). About the problem of population growth and carrying capacity, Chase suggests that "what is very striking to observe is that everywhere on this Earth where good standards of justice prevail, the rate of reproduction is about the replacement rate…. It is a positive feedback loop with the most profound implications. Consider: for the sake of climate stabilization, there must be population stabilization; and for there to be population stabilization, *justice must prevail*" (Sixty, 91-92). Here Robinson tackles the population problem while avoiding the standard critique that focusing on population constitutes a form of eco-fascism.[29] Chase further promises to commit the United States to the global justice project:

> This means accepting the jurisdiction of the International Criminal Court, and the jurisdiction of the World Court in the Hague. It means abiding by all the clauses of the UN Charter and the Geneva Conventions, which after all we have already signed. It means supporting UN peacekeeping forces, and supporting the general concept of the UN as the body through which international conflicts get resolved. It means supporting the World Health Organization in all its reproductive rights and population reduction efforts. It means supporting women's education and women's rights everywhere, even in cultures where men's tyrannies are claimed

[29] In a discussion of neo-Malthusianism, Greg Garrard reminds us that "the 1994 UN Conference on Population and Development exhibited remarkable agreement that non-coercive population control is a priority both for economic development and environmental sustainability, proposing that education and primary healthcare, especially for women, were the most effective means available" (98).

> to be some sort of tradition. All these commitments on our part will be crucial if we are serious about building a sustainable world. (Sixty, 92)

Chase is good on his word. By the end of the novel, President Chase has worked with the UN and the Chinese government to institute the "Great Leap Forward at Last." The US provides its nuclear submarine fleet to power the Chinese electric grid while they convert their dirtiest coal-burning plants to clean power. The United States offers all the technological and scientific help that the Chinese need, along with money to build the new power plants. In partial exchange, the Chinese agree to recognize Tibet as an autonomous region.

In terms of climate change, the presidency of Barack Obama stands in contrast to the fictional presidency of Phil Chase. President Obama did not make the strides hoped for at Copenhagen in 2009 or in Cancun the following year. During his presidency, public concern about climate change has dropped to an all time low, largely because of the United States' inability to negotiate effectively with China. In 2011, Republicans in Congress have voted along party lines not to recognize the legitimacy of climate science and are currently working to strip the EPA of its power to regulate greenhouse gas as pollution. In the weeks before the 2010 BP oil spill in the Gulf of Mexico, the major domestic environmental disaster of his presidency, President Obama spoke in favor of expanding offshore drilling. On the other hand, President Obama's primary domestic concerns have been the flagging economy and reforming health care, while his primary international concerns have been the wars in Iraq and Afghanistan in which the United States is still embroiled. Looked at from this perspective, Robinson's novels, in their concern with abrupt climate change, do not seem as immediately relevant.

Iraq and Afghanistan are almost entirely absent from the *Science in the Capital* trilogy. Robinson also fails to imagine anything resembling the Tea Party to oppose Phil Chase in his eagerness to reform the system and cooperate with the UN. Octavia Butler's novels come closer to imagining this kind of conservative opposition to progressive change.

The major geo-engineering projects in the novels include the salting of the North Atlantic Ocean in order to re-start the thermohaline pump, the release of genetically modified lichen in Siberia to increase the metabolism of the forest, increasing its capacity to draw down carbon, and an Antarctic water pumping project, designed to move water from the ocean to the center of the continent, where it will re-freeze. Along the lines of Frederick Buell's literal reading of the *Mars* trilogy, one could find a similarly troubling aspect to Robinson's descriptions of large-scale geo-engineering projects in the *Science in the Capital* trilogy. From this perspective, there is a level of technological optimism in the series that coincides with an acceptance of environmental catastrophe as inevitable. Robinson himself has said that he does not see geo-engineering of the type he describes in the trilogy as an advisable approach to dealing with climate change, and he approaches geo-engineering with his characteristic nuance and self-criticism throughout the trilogy. And yet, despite this nuance, the novels still promote geo-engineering solutions to catastrophic climate change.[30] Along the same lines, one might criticize Robinson's choice to depict an abrupt climate change scenario. The IPCC

[30] A Semptember 2008 article in *The Economist* reported that the Royal Society, Britain's oldest scientific academy, had published a series of papers on geo-engineering in its *Philosophical Transactions* outlining various options and experiments. The article points to two types of fears about geo-engineering -- fears of technological hubris and fears of moral hazard. Geo-engineering involves the possibility of large-scale unintended consequences at the same time as it provides an excuse to continue to pollute the atmosphere as usual.

explicitly excludes abrupt shift scenarios from the scenarios it uses in modeling future climates. By relying on an abrupt climate change scenario, then, Robinson gives up a certain amount of relevance. One is forced to ask, would it be possible to muster the political will to enact these changes in the absence of an abrupt shift?

The *Science in the Capital* trilogy makes important use of humor and comedy. Prettyman identifies several examples of comedic moments in the text, from the President's science advisor being named Dr. Strengloft, an allusion to Stanley Kubrick's dark comedy, to the outrageous facts that Edgardo posts in the "Department of Unfortunate Statistics," to the oil tanker named *Hugo Chavez* that Frank and Diane board to watch the restarting of the Gulf Stream. In thinking about the rhetoric of climate change, there is something important in Robinson's use of humor. There is a tendency toward paralysis in the more apocalyptic framings of climate change, a sense that the problem is too big to be solved. Robinson's sense of humor works against this kind of paralysis. It is a mode of coping – once again pragmatic – and a way of moving forward in spite of overwhelming catastrophe.[31] At the beginning of *Sixty Days and Counting*, Frank thinks of his own life:

> It was a relief to think that all these personal problems were as nothing compared to the trouble all life on Earth now faced as a functioning biosphere. There were days in which he welcomed the bad news, and he saw that other people were doing the same. As this unpredictable winter blasted them with cold or bathed them in Caribbean balm, there grew in the city a shared interest and good cheer, a kind of solidarity. (7)

[31] See also Joseph Meeker's *The Comedy of Survival* on the role of humor in environmental rhetoric.

Frank's thought here matches Robinson's sense that climate change presents a productive challenge for humans. It calls upon our better natures – and it also gives us a healthy sense of our significance within the planetary ecosystem – as individuals, as a community, as a species. We see in Kim Stanley Robinson's writing an alternative take on the disaster story. Instead of catastrophe, Robinson offers a narrative of fortunate crises.

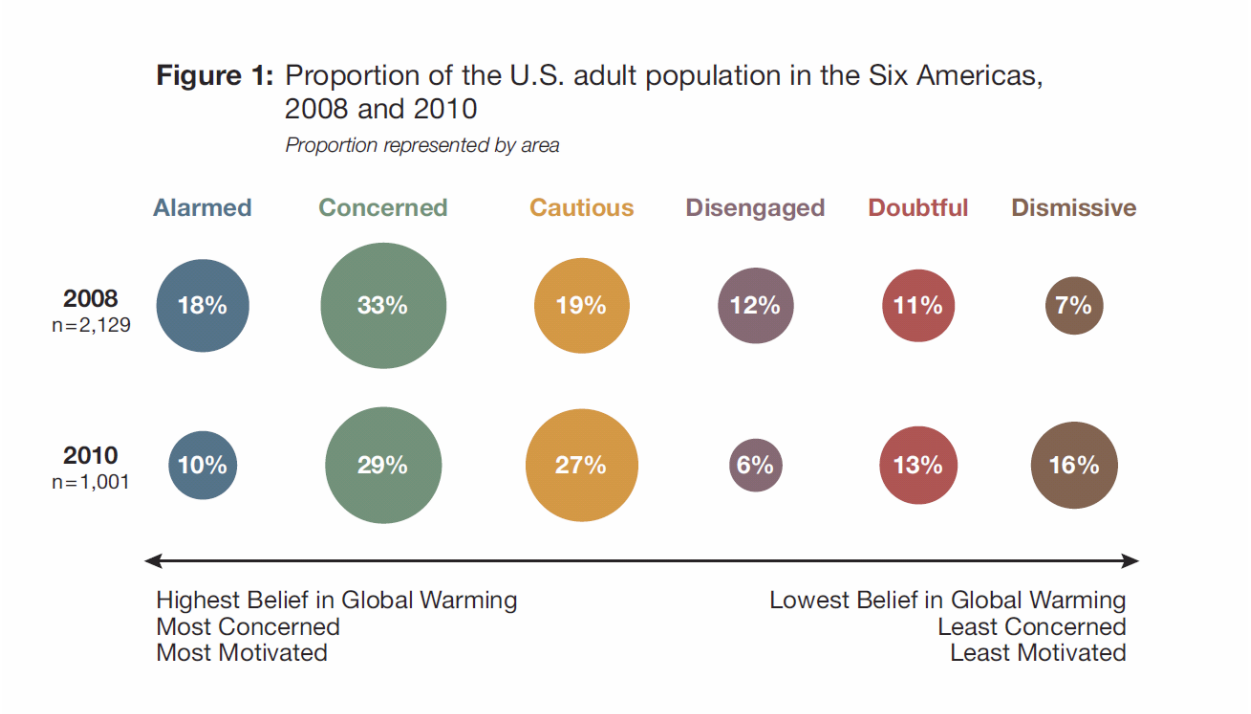
Finally, it is worth considering the way that Robinson works within his medium – there is not the spectacle of the screen in his novels. Instead, there is an appreciation for character development and the opportunity for exposition. His novels aim to educate and to prompt nuanced critical thought. They also aim to entertain, but the pleasures to be had in Robinson's work are not the titillation of the Hollywood narrative, they are rather the pleasures of sustained contemplation. There is an insight to be had here about representing climate change. Robinson comments on the way that geologic time scales become human time scales with abrupt climate change. As Jameson has commented about the *Mars* trilogy, there is significance to the sheer length of time it takes to read the series. It creates a physical experience that corresponds metaphorically to the extended duration of a terraforming experiment on Mars. Similarly, it takes time to describe climate change on Earth, more than just two hours – the length of a Hollywood movie like *The Day After Tomorrow*. Robinson's *Science in the Capital* trilogy thus makes an important generic argument – science fiction is the genre of climate change, and in particular, long science fiction is the form that best expresses the scale of climate change. This issue of duration, of effectively representing timescales that exceed human lives, has significance for scenario thinking practices. Climate change takes time, sustained

concentration, to confront effectively. There is pressure to make scenario descriptions concise for rhetorical effectiveness in the policy realm. In the scientific realm this is less of a concern, because there is pressure to elaborate scenarios at various scales for fullness of description, but even in the scientific realm, the length of Robinson's trilogy presents a challenge, and perhaps a model, for revised scenario methodologies.

CHAPTER VI

CONCLUSION

In 2009, the Yale Project on Climate Change and the George Mason University Center for Climate Change Communication published a report called *Global Warming's Six Americas: An Audience Segmentation Analysis*. As the title suggests, the report identifies six categories of response to climate change: alarmed, concerned, cautious, disengaged, doubtful, and dismissive. The initial surveys were conducted in 2008, and the project has continued with follow-up reports. Between 2008 and 2010, the proportions of the different categories shifted significantly.



(Yale/George Mason University Six Americas, Jan. 2010)

The group of Americans who are dismissive, who think that global warming is not happening and is probably a hoax, more than doubled in size between 2008 and 2010. At the same time, the group who are alarmed about climate change decreased by almost half. Less dramatically, but following the same trend, the number of Americans concerned decreased while the number of doubtful increased. The authors of the report speculate that a "perfect storm" of events – high unemployment numbers, public frustration with Washington, attacks on climate science, and mobilized opposition to national climate legislation – caused this shift in public concern about climate change. At the same time, however, the authors note that majorities in all six groups favor the development of clean energy, support funding for research into renewable energy sources, and support tax subsidies for people buying solar panels and energy efficient vehicles.

One way to interpret these data is to consider that the apocalyptic narrative of climate change has reached a kind of saturation point. The numbers in the "alarmed" category have decreased while the number of people dismissive of climate change have increased in part because the public has come to see climate change as a story. And the story of the end of the world, while titillating, always arrives at a dead-end. The utopian narrative of climate change, on the other hand, continues to hold interest for the respondents. The 2010 respondents support constructive policy measures that promote positive change – particularly the development of clean energy technologies. One reading of this consensus is that the respondents have access to enough plausible visions of alternative energy to agree on this aspect of a better future.

Considering again that the numbers of "doubtful" and "dismissive" respondents have increased, it seems that at another level, the question of whether or not climate

change is "really happening" might fade into the background, while the question of what the global community will do to manage the Earth's resources in the future, both human and non-human, must move to the foreground. There is in this shift a return to politics. Constructing positive visions of alternative futures is a political act, inevitably raising questions about means -- how we get from here to there. What policy measures must be enacted (to create a better world)? What regulations and deregulations must be put into place?

I want to argue for utopian storytelling itself as a necessary and potentially democratic technology – and to consider what it would mean for utopia to move in this direction. I return here to Erin McKenna's notion of "process utopia" and Ruth Levitas' conception of utopia as a methodology. Because of the danger in emphasizing ends over means, process must become the focus of utopian inquiry. Furthermore, for utopia to become a democratic technology, the issue of authorship must be addressed – the authorship of utopia must become collective, diverse, and participatory. Whose vision of a better future? Better for whom? How many visions are possible? We might imagine multiple storylines coexisting, operating on multiple scales, sometime in harmony, sometimes in conflict with one another. As a democratic technology, utopian storytelling operates as a tool for exploring collective futures, for expressing diverse values within an optimistic framework that turns on the possibility of a better world.

I would like to end by pointing to two projects that illustrate the possibilities of a reinvigorated utopian methodology. First, launched in 2003, the Tellus Institute's "Great Transition Initiative" is a network of scholars and activists elaborating positive scenarios of the future. Paul Raskin directs the project, Orion Kriegman is the coordinator, and

Tariq Banuri and Allen White are senior advisors. The Great Transition Initiative was preceded by the Global Scenario Group, an international scenario group convened by the Tellus Institute in Boston and the Stockholm Environment Institute to examine the requirements for a sustainable and desirable future. The scenarios developed by the Global Scenario Group were used as the basis for the scenarios in the United Nations Environment Programme's *Global Environmental Outlook* reports. The Global Scenario Group's culminating essay was entitled *Great Transition: The Promise and Lure of Times Ahead*, and the Great Transition Initiative was created as a way to continue this project. Perhaps most interestingly, the Great Transition Initiative has developed a paper series entitled "Frontiers of a Great Transition," which expands the scope of the original essay, focusing on aspects of the original project that are enhanced by further elaboration. For example, the essays include "Visions of Regional Economies in a Great Transition World," "Transforming the Corporation," "Feminist Praxis: Women's Transnational and Place-Based Struggles for Change," and "Great Transition Values: Present Attitudes, Future Changes." These essays are written by multiple authors and explore perspectives that both interrogate and expand the vision described in the original essay. Cited by James Gustave Speth in *The Bridge at the End of the World*, the Great Transition Initiative provides a model for what utopian scenario thinking might look like at the policy level and how a network of scholars and activists might coordinate to construct an ever-expanding vision of positive alternative futures.

On a more local level, I want to point to Gwen Dismukes' book *Black 2 the Future* (2007). A resident of The Farm, a utopian community in Summertown, Tennessee, Dismukes published her book through The Farm's educational press. Writing

under the pseudonym gwen.evolution, she structures her story as a dialogue between two youthful narrators – Immanuel and Yasmin – who live in the future, but because of negligent behavior, have been required to return to the reader's present and tell their story. They describe the formation of a community that comes together for fellowship and growth and then becomes one of the few groups to survive economic collapse: "We envisioned our community as a prototype of a society that was integrated at all levels of being and that cared for the physical, emotional, and spiritual needs of all living things as a whole" (9). As the community grows, the members gain insights and produce innovations in social organization from education to healthcare, from governance to entertainment. With subheadings like "A new approach to government" "Meditation in the classroom" "From faith-based to spirit-informed," *Black 2 the Future* employs the conventional utopian trope of a narrator who returns from utopia and operates in the descriptive mode, explaining various aspects of society in the future. Dismukes makes reference to the Highlander Folk School, R. Buckminster Fuller, and Martin Luther King, Jr. as important influences on the community from the past. Dismukes also includes real-life figures with slightly less notoriety.

In a section entitled "Riding on the Rhythm" she includes a description of "Sizwe, our South African gardener" who "taught several people drumming and how to make their own drums, so that we always had the primal force of rhythm" (11). The Sizwe of *Black 2 the Future* is a fictionalization of Sizwe Herring, an environmental educator in Nashville. Sizwe directs EarthMatters Networks, a non-profit organization promoting environmental awareness and social justice. Through EarthMatters, Sizwe runs programs like Kids to the Country – a multicultural summer nature study program for Nashville's

at-risk youth. He also runs the George Washington Carver Food Park, a community garden and composting site in Nashville. In the story, explaining to the community how to deal with disruptive forces through the metaphor of weeding a garden, Sizwe describes his role: "Protecting what is in my care is what I do in my garden. And that's what I do in my life" (25).

Dismukes begins her book with the premise that "We are crossing over; as a race of human beings we are becoming more than we have ever been, while still only touching the surface of what we will yet evolve to be" (3). Explaining the title, she further suggests that "nobody knows more about crossing over than black folks…. The black experience—its faith and sensibility, its history, its expression through art, culture, and lifestyle—can make an enormous contribution in leading all of us humans into a new understanding of our common, transcendent spirit and the essence of life" (3). *Black 2 the Future* draws upon the wisdom of the black experience in order to articulate a vision of the future that might resonate across race and ethnicity. In Nashville, Sizwe runs EarthMatters with a similar sense of purpose and identity. With an emphasis on art and connection to nature, as well as a mission to promote green jobs education, EarthMatters works to envision a better world, and also to enact it. There is an important intertextuality at work here – a way in which *Black 2 the Future*, The Farm, and the George Washington Carver Food Park are mutually reinforcing utopian projects. Sizwe Herring is an inspiration for Sizwe the gardener in *Black 2 the Future*. At the same time, Sizwe Herring takes inspiration from Dismukes' story. *Black 2 the Future* celebrates and inspires on-the-ground utopian experiments.

In the spring of 2011, the George Washington Carver Food Park was partially destroyed by the Tennessee Department of Transportation. TDOT tore down a pavilion that provided shelter and a gathering space, and they bulldozed the compost pile, which had been shaped as earth art to look like a heart. The Food Park is located on TDOT land, where it has been for over twenty years with TDOT's permission and local government support. As neighborhood demographics changed over time, however, newer residents were less enthusiastic about the Food Park. Of particular concern was the compost pile, which they considered an eyesore. Also of concern was the noise that came from events that the Food Park hosted. The destruction of the Food Park raises many issues, from issues of race and class to those of property ownership and public land. In its relation to utopia, I want to suggest that part of what was lost in the destruction of the Food Park was a shared vision of the future.

These examples prompt reflection on the issue of scale. The challenge of climate change can appear overwhelming. Efforts to confront climate change have tended to focus on either the global scale, emphasizing international policy measures, or on the individual scale, emphasizing consumer choices. These approaches are important, but perhaps the most important scale at which we need to re-imagine the future is that of the community. A democratic utopian technology will put neighbors back in touch with one another, and it will promote new forms of local affiliation. In *Black 2 the Future*, gwen.evolution writes, "Fortunately, our growing consciousness is allowing us to see that we are, in fact, determining what we evolve into by thinking about it as we go along. We Create our own reality, and we are creating our future" (3). It is only by imagining a better world that we will ever inhabit one. Utopia is our best tool for getting there.

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