Introduction

Imagining the Future of Climate Change

In Bong Joon-Ho's 2013 international blockbuster *Snowpiercer,* a single train traverses the globe, protecting the final remnant of humanity from an Ice Age that made the planet seemingly uninhabitable. Set in 2031, the film begins by squarely placing the blame on humans for this catastrophic climate change. As the opening credits roll over dark, starry space, we hear crackling, fuzzy excerpts of news broadcasts from all over the world telling how, despite protests from environmental groups and "developing countries," on 1 July 2014, seventy countries dispersed the artificial cooling substance CW-7 into the upper layers of the atmosphere. Because "global warming can no longer be ignored," one of the disembodied voices explains, seeding the skies with CW-7 was a last-ditch effort "to bring average global temperatures down to manageable levels as a revolutionary solution to mankind's warming of the planet." But before the real action of the film even starts, we learn the grim outcome of this desperate international scientific experiment. Two short sentences loom large on the screen: "Soon after dispersing CW-7 the world froze. All life became extinct."

In imagining a geo-engineering experiment gone wrong in response to the disaster of global warming, Bong is asking us to think critically about the solution to the problem of climate change that is favored by many people, states, and corporations invested in finding alternatives to curbing carbon emissions.[1] In addition, since the mid-2000s, some prominent scientists, such as Dutch Nobel Prize-winning atmospheric chemist Paul Crutzen, have also advocated exploring geo-engineering out of fears that states will not take the necessary actions to curb global warming in time and that we are on the brink of locking in dystopian climate change that will render unsustainable life on Earth as we know it. Geo-engineering refers, in Clive Hamilton's words, to "deliberate, large-scale intervention in the climate system designed to counter global warming or offset some of its effects."[2] Hamilton distinguishes two classes of geo-engineering: carbon dioxide removal technologies that try to remove excess carbon dioxide from the atmosphere and store it elsewhere, and solar radiation management technologies, which aim to reduce the amount of sunlight reaching the planet, thereby mitigating one of the most prominent symptoms of global warming without fixing the cause. Many techno-fix fantasies imagine blocking the sun through a range of methods including space mirrors, spraying seawater into the sky to create more cloud cover, or spraying sulfate aerosols into the stratosphere, as we see in *Snowpiercer*. According to Hamilton, "the idea of spraying sulfite particles into the upper atmosphere was sparked by observing the effects on the weather of volcanic eruptions"—a phenomenon that scientists have been aware of as far back as the eighteenth century—which provoked scientists to imagine "countering global warming by mimicking the cooling effect of volcanoes" (59). Hamilton calls stratospheric aerosol spraying

"the archetypal geo-engineering technique" since "it would be easy, effective, and cheap, and have the most far-reaching implications for life on Earth" (59). Geo-engineering projects carry significant risks, however, since as Hamilton puts it, the earth's climate is a nonlinear, complex system and introducing changes may create unpredictable effects, including, among others in the case of aerosol spraying, the possibility of disrupting the Indian monsoon, thereby "affecting food supplies for up to two billion people" (64).

In interviews, Bong clarifies that he was indeed thinking of geo-engineering as a hubristic project that introduces giant risks for huge parts of the world in an effort to keep the machine of global fossil fuel capitalism going. In a press kit released with the film, the synopsis also emphasizes the connection between climate change and class inequalities: "Climate change has made the planet uninhabitable" and "the world inside the train is far from equal."[3] When asked if the film is a response to climate change, Bong replied that while in South Korea people talk about how China's environmental issues impact Korea and circulate rumors about China's geo-engineering projects, he was trying to call attention to "how big business tries to both use and control nature," since "it's not in their interests to change." He also claims "it's not humans per se, but capitalism that's destroying the environment" and that if we could "control human greed," it would "go a long way towards slowing down our ongoing environmental disaster."[4]

As the recent proliferation of geo-engineering schemes suggests, the idea that humans can master nature without risk or cost is a deep fantasy, but in *Snowpiercer,* as in many such attempts to control nature in the history of speculative fiction, arguably beginning with Mary Shelley's *Frankenstein,* this effort backfires. In Bong's words, "Nature takes its revenge and sends them back

to the ice age."[5] Bong further explains that *Snowpiercer* is a science fiction film precisely because the latter is "a genre where you can express the human condition and systems in which we live much more directly and symbolically," which helped him explore questions about climate change and global class inequalities and stage them for a global audience.[6]

Snowpiercer is only one of many recent speculative fictions that make climate change the central problem in imagining the future, often in a dystopian mode. That's not surprising, because imagining the future of climate change at this moment is frightening. For years now scientists have issued warnings about what will happen if we fail to act soon. More dramatic and destructive storms, the loss of biodiversity, species extinction, and sea level rise are just a few of the changes that are no longer on the horizon but are happening now. Every day, new stories circulate about the latest signs of impending catastrophic climate change. Meanwhile, radically transformed climates are at the heart of a lot of science fiction, so much so that a whole new subgenre called cli-fi has emerged. Cli-fi or climate change fiction is best situated within the larger category of speculative fiction, an umbrella genre that includes science fiction and fantasy. In 2013, National Public Radio (NPR) and the *Christian Science Monitor* began to use the term cli-fi to encompass a wide variety of dystopian visions of near-future climate change, including Barbara Kingsolver's *Flight Behavior,* Nathaniel Rich's *Odds against Tomorrow,* and Margaret Atwood's *The Year of the Flood.* Since then the subgenre has exploded.[7]

While I dip into cli-fi here and there in this book, in what follows I tell the story of imagining the future of climate change by focusing especially on movements, speculative fictions, and futurisms of Indigenous people and people of color—work that is

all too often excluded from the category of cli-fi and that extends beyond cli-fi in its rich and deep connections to social movements and everyday struggles and to other cultural forms such as film, video, music, social media, and performance. In Amitav Ghosh's bracing book *The Great Derangement: Climate Change and the Unthinkable,* he, like many before him, excludes science fiction from serious consideration as a contributor to debates over climate change, arguing, following Margaret Atwood, that "the Anthropocene resists science fiction" because the latter focuses on "an imagined other world located apart from our ours." He also argues that despite a few notable exceptions such as Liz Jensen's and Barbara Kingsolver's novels, even cli-fi, with its realist elements, fails because it "is made up of disaster stories set in the future" rather than examining the recent past and present.[8] In contrast, I argue in what follows that people of color and Indigenous people use science fiction and other speculative genres to remember the past and imagine futures that help us think critically about the present and connect climate change to social movements.

Here and throughout this book I distinguish between people of color and Indigenous people even though historically these identities often intersect and converge. I make this distinction in order to recognize particular histories of settler colonialism, treaty-making, dispossession, nationhood, and citizenship that situate Natives differently than non-Native people of color in the United States and the Americas. Settler colonialism is a distinct kind of colonialism that aims to eliminate and replace Natives by settling on and extracting value from their lands.[9] Furthermore, since 1924, Native Americans have possessed dual citizenship: they are documented as citizens by their tribal nations as well as by the United States. The use of the term

"people of color" in the United States, on the other hand, can be traced at least as far back as the French colonies in the Americas, where it was used to refer to people of mixed African and European descent who were not slaves. It is currently a keyword in scholarship on race and ethnicity in the fields of ethnic studies and American studies, where it refers to people who are not white. Often, such scholarship explores coalitions, solidarities, and social movements that connect groups, while also attending to contradictions and differences that shape the latters' relations to each other, the United States, and the world. In that spirit, in what follows I analyze how Indigenous people and people of color in the United States, through their art, activism, and speculative fictions, respond to climate change by imagining futures that are sometimes in sync with each other and sometimes not. Although this is a selective lens for envisioning the future of climate change, it is a richly illuminating one that yields important insights and possibilities that we miss when the focus is only on nation-states, transnational corporations, research scientists, and politicians as significant agents and explainers of change.

In focusing on social movements and cultures of climate change, I build on "social movements and culture" methodologies used in American Studies. As modeled by scholars such as Michael Denning and George Lipsitz, such methodologies look for meaning in the connections people make between cultural texts and the important social movements of their times. Today a transnational movement from below, significantly led by Indigenous people and people of color, is one of the most powerful forces opposing the fossil fuel industry's transnationalism from above. My goal is to introduce the history and most significant flashpoints in imagining the future of climate change over which these movements currently struggle. Speculative fiction and

Indigenous and people of color futurisms both illuminate and make that history. But first it is necessary to understand the theory of global warming that is also central to that history.

A BRIEF HISTORY OF GLOBAL WARMING

Earth's temperature is determined by the difference between the energy received from the sun and the amount that is released back into space. Ozone absorbs some incoming solar shortwave radiation and about a third of the solar energy returns to space, while the land and ocean absorb what's left. The land and ocean then radiate this warmth "as long-wave infrared or 'heat radiation.' Atmospheric gases such as water vapor, carbon dioxide, methane, and nitrous oxide are known as greenhouse gases as they can absorb some of this long-wave radiation, thus warming the atmosphere." This is what we call the "greenhouse effect": "Since the industrial revolution we have been burning fossil fuels (oil, coal, natural gas) deposited hundreds of millions years ago, releasing the carbon back into the atmosphere as CO_2 and CH_4, increasing the 'greenhouse effect' and elevating the temperature of the Earth." Within the span of one century, we have put more carbon into the atmosphere than during the previous thousands of years.[10]

Mathematician Joseph Fourier first formulated what we now call the theory of the greenhouse effect in 1827. Three decades later, in 1859, John Tyndall identified carbon dioxide, methane, and water vapor as greenhouse gases, and in 1896 Svante Arrhenius made remarkably astute predictions of how much the climate would change in response to changing concentrations of carbon dioxide in the atmosphere. He calculated that doubling carbon dioxide would increase the temperature of Earth by an average of 4 to 6 degrees Celsius, and, according to David

Archer and Stefan Rahmstorf, "in spite of the crudeness of the data available and a few questionable assumptions, Arrhenius got the answer basically correct."[11] During the 1940s, technologies of measuring CO_2 radiation interception improved dramatically and in 1955, Gilbert Plass proved that adding CO_2 to the atmosphere intercepted more infrared radiation and kept it from being lost to space, thereby warming the planet. Finally, at the end of the decade in 1959, Plass published an article in the *Scientific American* called "Carbon Dioxide and Climate," in which he ominously warned that "if carbon dioxide is the most important factor" in increasing Earth's temperature," then "long-term temperature records will rise continuously as long as man consumes the earth's reserves of fossil fuels."[12]

Still many scientists, including Plass himself, believed oceans might serve as giant sinks absorbing the extra carbon dioxide produced by humans until Roger Revelle and Hans Suess of the Scripps Institute of Oceanography in La Jolla, California, challenged that idea by arguing that sea water was already saturated with carbon dioxide and thus oceans would not be able to absorb the excess produced by humans to the extent previously imagined; they ominously concluded that carbon dioxide was therefore very likely increasing in the atmosphere. In 1958, Charles David Keeling began taking daily measurements of the concentration of atmospheric carbon dioxide at the Mauna Loa Observatory, a project that has continued up to this day. As a result, he devised what is now called the Keeling CO_2 curve, a graph that plots the ongoing change in concentrations of carbon dioxide in Earth's atmosphere since 1958. This evidence helped Keeling demonstrate the existence of a cycle that responded not only to the growth and decay of land plants in the northern hemisphere but also to long-term increases created by burning fossil fuels.

Within "a very few years he could see that the annual maximum value for CO_2 was steadily rising." [13]

In response to new research as well as the concern for the environment sparked by Rachel Carson's book *Silent Spring* (1962), the 1960s witnessed the proliferation of grassroots movements, large nonprofit organizations, and environmental institutions created by nation-states. One important flashpoint was the formation of a U.S. President's Science Advisory Committee on Environmental Pollution, which in 1965 announced that "pollutants have altered on a global scale the carbon dioxide content of the air."[14] An appendix entitled "Atmospheric Carbon Dioxide" partly authored by Keeling and Revelle explained in detail how carbon dioxide that remains in the atmosphere has "significant effect on climate," acting "much like the glass in a greenhouse" to "warm the temperature of the lower air" (113). The authors warned that "through his worldwide industrial civilization, Man is unwittingly conducting a vast geophysical experiment" (126), burning within a few centuries the carbon that had accumulated for the last five hundred million years, and predicted the possibility of the melting of the Antarctic ice cap, catastrophic sea level rise, the warming of ocean waters, and many other disasters if nothing was done. Another important organization formed in 1967 was the Environmental Defense Fund, a U.S.-based nonprofit created by scientists as part of an effort to ban DDT but that grew into a major environmental advocacy group, albeit one that is now widely criticized for its collaborations with big corporations and business-friendly solutions to environmental problems, something that continues to limit the effectiveness of the mainstream environmental movement today.

In the 1970s, many scientific research projects focusing on carbon dioxide and climate emerged to build on Keeling's and

Revelle's work, while the dramatic impact of human release of other greenhouse gases such as methane, chlorofluorocarbons, and nitrous oxide was also measured. Next, a flurry of government institutions was created in response to emerging public concern and pressure about environmental problems. Following the 1969 National Environmental Policy Act (NEPA), several new environmental laws were passed, including one requiring environmental impact reports for major state projects. The next year, in 1970, the first Earth Day took place in the United States. Earth Day was the idea of Wisconsin Senator Gaylord Nelson, who proposed a massive teach-in after witnessing the ravages of the 1969 massive oil spill in Santa Barbara, California. Twenty million people ended up participating in these events, which took place across the nation, received wide media coverage, and precipitated the formation that year of the Environmental Protection Agency and the passage of the Clean Air, Clean Water, and Endangered Species Acts. Also in 1970, the U.S. National Oceanic and Atmospheric Administration, which would become the world's leading funder of climate research, was formed. While the first UN Environmental Conference in Stockholm in 1972 devoted little time to climate change, in 1975, the coinage by U.S. scientist Wallace Broecker of the term "global warming" in a scientific paper introduced the phrase into the language of science and eventually into official reports and media stories.

In an article called "Climatic Change: Are We on the Brink of a Pronounced Global Warming?" in *Science* magazine, Broecker warned that after the next decade "the CO_2 effect will tend to become a significant factor and by the first decade of the next century we may experience global temperatures warmer than any in the last one thousand years"—which in fact has proven to be the case.[15] Then, in 1978, President Carter's decision

to resort to U.S.-produced coal in the face of the oil embargo put carbon dioxide production squarely on the political map. By 1979, the National Research Council declared there was now "incontrovertible evidence that the atmosphere is indeed changing and that we ourselves contribute to that change" as well as a "consensus" that there will be a "warmer earth with a different distribution of climatic regimes." In order to adequately address the question of how these changes would affect the complex web of life, the authors of the report noted, one would have to "peer into the world of our grandchildren."[16] Although the report did not go that far, leaving it to creators of speculative fiction to imagine future worlds transformed by climate change, it did warn that waiting to see might mean waiting too late.

While changing weather, warming oceans, and warnings about the future of the world's ecology and environment made the news as early as the 1960s, the 1980s was the key decade when climate change became a central topic in the media. By the 1980s, the global mean temperature was increasing rapidly, with 1981 the warmest year on record, while developments in climate modeling and research on climate history revealed how quickly transitions to warmer periods could happen, partly due to feedback loops that kick in when ice sheets start to melt, such as sea level rise. The election in 1980 of Ronald Reagan as president of the United States proved a serious setback to the emerging environmental movement since his administration was hostile to the small gains that had been made, pushed deregulation, and prioritized untrammeled economic growth over confronting environmental harms. In 1983, the National Academy of Sciences issued a new report which stated that carbon dioxide in the last generation had increased from 315 to 340 parts per million by volume and that this increase was primarily attributable to

burning of coal, oil, and gases created by human activity. They concluded that as a result global mean temperatures would continue to rise, which would significantly reduce the availability of water in places such as the U.S Southwest and also threatened to cause dramatic sea level rises and the eventual disappearance of the West Antarctic Ice Sheet.[17] In 1985, the climate change alarm was sounded again by the British Antarctic Survey's report of ozone depletion over Antarctica and by 1987, the Vienna Convention's Montreal Protocol set international limits on the emission of gases that adversely affected the ozone.

In 1988 serious discussion of the need to reduce greenhouse gas emissions began to emerge as news coverage of global warming dramatically increased following a year of heat waves and droughts. It was also the year that scientist James Hansen testified before the U.S. Senate that "Global Warming Has Begun," as a 24 June *New York Times* headline put it. Hansen made history by telling the room of politicians that '"It is time to stop waffling, and say that the evidence is pretty strong that the greenhouse effect is here." That same year, the United Nations Environment Program (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC) to survey research on climate change and its potential environmental and socioeconomic impacts.

One year later, in 1989, in response to all this environmentalist activity and pressure, fossil fuel interests created the Global Climate Coalition (GCC), a group whose main focus was introducing doubt in the minds of citizens and politicians about the validity of climate science—a project that vigorously persists today despite the formal demise of this particular group in the early 2000s.[18] In a 2009 *New York Times* story, journalist Andrew Revkin reported on how for over a decade the GCC, which represented

industries whose profits depended on fossil fuels, "led an aggressive lobbying and public relations campaign against the idea that emissions of heat-trapping gases could lead to global warming."[19] Although internal documents later revealed that the organization's scientists largely agreed with the emerging consensus that burning fossil fuels was the biggest contributor to global warming, they nonetheless put huge amounts of money into arguing against the idea that international agreements were necessary in response, especially after the "Earth Summit," the 1992 Rio de Janeiro United Nations Conference on Environment and Development (UNCED) that took place in June 1992. For instance, the group spent 1.6 million dollars in 1997 alone, the year of the Kyoto Protocol, the international treaty in which 193 states agreed to reduce greenhouse gas emissions. According to climate scientist Benjamin Santer, IPCC author and one of the targets of the group's ire, the coalition was "'engaging in a full-court press at the time, trying to cast doubt on the bottom-line conclusion of the I.P.C.C.,' which had concluded in 1995 that 'the balance of evidence suggests a discernible human influence on global climate.'"[20] The 1991 and 1995 IPCC reports warned that burning fossil fuels was raising the mean global temperature of the planet and predicted significant sea level rise and other harms would cause catastrophic social, economic, and political problems if nothing was done to mitigate current patterns of greenhouse gas emissions. The 1997 Kyoto Protocol represented one response to increasing public awareness of this scientific research, as people pressed governments to act. Although the United States never ratified the protocol and though throughout the nineties the GCC continued to spend large amounts of money to undermine climate change science, reports of the breaking up of Antarctic ice sheets and signs of warming in polar regions continued to

shape public opinion and make the environment and climate an object of concern for social movements in the United States and around the world.

From the 1960s through the 1990s, environmental movements that emerged in response to climate change were the single biggest forces pressing states to act, while fossil fuel industry advocates lobbied hard against regulations, spreading doubt about climate change science, even as big polluter states like the United States and China balked at bigger changes. Critical to the formation of such social movements were cultural texts that moved large numbers of people to act and imagine alternatives to the greenhouse fossil fuel world. One of the earliest and most important of these was Rachel Carson's book *Silent Spring* (1962), which sold over two million copies and was translated into at least seventeen languages.[21] Carson was an aquatic biologist who became a nature writer in the 1950s. After writing three books about ocean life, she became financially independent and decided to write a book on how pesticides were altering human bodies and the planet. She uncovered a vast amount of evidence for the pesticide-cancer connection and also confronted the problem that persists to this day of industry experts putting resources into covering up or denying problems instead of addressing and solving them.

The book makes a forceful case for human-created damage to the planet and asks readers to consider how so-called scientific advances may also create new problems. It was incredibly successful at calling attention to such dangers and has been credited with provoking the creation of the Environmental Protection Agency by the Nixon Administration in 1970 and the phasing out of DDT by 1972 as activists and environmental organizations emerged to push forward Carson's research. The great science

fiction writer James Tiptree, Jr. / Alice Sheldon, a gender-bending woman who wrote under a male pseudonym for most of her life, looked back in the mid-70s and commented that, though most women, like the mythical Cassandra, are doomed to speak the truth and never to be believed, Carson was "maybe the last to break through" with "an unpleasant truth" and still be heard.[22] Despite being attacked by the chemical companies, Carson's research held up and she was widely recognized as a hero of the environment, although sadly it was soon discovered that she had breast cancer. She was weakened by radiation treatments as the acclaim and criticisms began to roll in, and though she continued to make appearances to support *Silent Spring*'s findings, she died less than two years after the publication of her world-changing book. In her wake, *Silent Spring* inspired a movement.

SPECULATIVE FICTIONS OF CLIMATE CHANGE

Silent Spring changed the world because of the way it was written and also because of Carson's creative use of multiple media platforms to communicate her message. The book was initially serialized in three parts in three June 1962 issues of the *New Yorker* magazine, where it caught the eye of many readers and the chemical industry. Excerpts were also serialized in *Audubon* magazine and the *New York Times* published a positive editorial about it. One of the biggest boosts to *Silent Spring*'s popularity came when it was chosen as a Book of the Month Club selection for October, which Carson observed made people aware of it in parts of the United States that "didn't know what a bookstore looks like—let alone *The New Yorker*."[23] Her appearance on the TV show *CBS Reports* on April 3, 1963, entitled "The Silent Spring of Rachel Carson," also made a big impact on the new TV-watching public, as Carson went

head to head with Robert White-Stevens, a spokesman for the agricultural chemical industry, and calmly bested him with her steady demeanor and mastery of facts. As the *New York Times* put it the day after the program aired, after watching it a "lay viewer" had been exposed to the logic of both sides and "would still agree with the program's central conclusion": that Carson's "theme is sufficiently persuasive and disturbing" to warrant "intensified research" on "the long-term consequences" of pesticides and other chemicals.[24] Her testimony before the Senate Commerce Committee in June 1963 was also widely covered in the media.

Notably, in order to engage the nonscientist reader, *Silent Spring* begins with a piece of speculative fiction, "A Fable for Tomorrow." This brief chapter focuses on an imaginary town that "does not actually exist" but "might easily have a thousand counterparts in America or elsewhere in the world" (3). While the narrator initially invites the reader to picture "the abundance and variety" of the town's "bird life" (2) and its clear, cold water full of fish and other living things, the tone suddenly, dramatically shifts as a "strange blight" falls over the earth, causing animals to die, introducing new diseases into families, producing unexplained deaths, even among children, and making the birds disappear. No bees come to pollinate and the fish disappear from the waters as this "stricken world" of endless "disasters" (3) transforms into a harsh, forbidding, dystopian landscape.

Imagining the silencing of "the voices of spring" in "countless towns" (3) across the nation, Carson's speculative fiction was so effective that it provoked a response in kind from Monsanto, which produced its own corporate speculative fiction, called "The Desolate Year." Published in *Monsanto Magazine* and widely distributed, it asked readers to imagine a year without pesticides, warning that disgusting, rapacious bugs would invade the world and turn up

everywhere, including "yes—inside man," who would have "no weapon but a fly swatter against rampant bed bugs, silverfish, fleas, slithering cockroaches, and spreading ants," that ticks would "leap" onto "people," and slice "deeper and deeper" into their flesh, gorging on it and becoming "many times their normal size.[25] Despite such corporate efforts, *Silent Spring's* popularity led to the banning of eight of the twelve pesticides covered in her book, while restrictions were put on three others as well.

Two of the most enduring and important legacies of Carson's book, however, are modern environmental movements and the continuing struggle over the role of states in defending the environment and the planet. In response to Carson's work and to DDT tragedies on Long Island, in 1967 ten scientists formed the Environmental Defense Fund, which began bringing lawsuits against the state to establish citizens' rights to a clean environment. The state responded with a flurry of new policies and institutions, including the passing, in 1969, of the National Environmental Policy Act (NEPA), which created a Council on Environmental Quality (CEQ) at the White House and introduced a new requirement for environmental impact statements. In December 1970, the U.S. Environmental Protection Agency (EPA) was created. In the more than half century that has passed since *Silent Spring's* publication, Carson has become a hero of the environment for a new generation of activists who are inspired by her example. This impact crucially depended on her imaginative approach to communicating science to lay readers and her talent at using multiple media platforms and cultural forms to make people care about stopping the "reckless and irresponsible poisoning of the world that man shares with all other creatures" and learning, instead, to cultivate "our accommodation to the world that surrounds us" (ix).

Today's cli-fi writers are connected to Carson and indebted to her as a precursor in their efforts to combine science and speculative fiction, which are evident in recent anthologies such as *Loosed Upon the World: The Saga Anthology of Climate Fiction* (2015). This collection includes several climate change stories by notable writers such as Kim Stanley Robinson, Atwood, and Paolo Bacigalupi, author of many award-winning stories and novels including *The Water Knife* (2015), a near-future thriller about climate change, drought, and water wars set in the U.S. Southwest. In a foreword, Bacigalupi argues that when creating a cli-fi world, "you have the chance of making people engage not with the future, but with the intense realities of our present—the realities that were previously passing them by." He hopes that by experiencing climate change "viscerally" through fiction, instead of abstractly or theoretically, readers of cli-fi will be ready to "think long term effectively."[26] Bacigalupi's insight that climate change fiction encourages people to engage with "intense realities" of the present that might otherwise go unnoticed resonates with the great writer and critic Samuel Delany's remark that "science fiction is not about the future; it uses the future as a narrative convention to present significant distortions of the present." In other words, Delany suggests that some science fiction stories can help us take hold of the present and engage its intense realities instead of passively letting it pass by without thinking about where things are heading.[27] A good deal of cli-fi works on this principle, distorting our present by representing it as the past of an imagined future, as literary critic Fredric Jameson says classic science fiction writer Philip K. Dick often does, in ways that can help us think critically about what we need to do in the present to keep the worst from happening.[28] But because cli-fi is a capacious subgenre that incorporates other ele-

ments besides science fiction, the umbrella term "speculative fiction" is a more useful category within which to place it.

The term "speculative fiction" has a long and complicated history that, like the conversation about human-caused climate change, goes back at least to the nineteenth century. In 1889 *Lippincott's Monthly Magazine* used the term to describe Edward Bellamy's utopian novel *Looking Backwards, 2000–1887* and several other fictions set "in the future tense." Robert Heinlein, author of dozens of science fiction novels, notably including *Starship Troopers* (1959) and *Stranger in a Strange Land* (1961), also used the term in the mid-twentieth century, at first as interchangeable with "science fiction" and in ways that specifically excluded fantasy. In 1947 Heinlein wrote that he preferred "speculative fiction" to "science fiction" because the term better captured the genre's ability to ask big and important questions about "sociology, psychology, esoteric aspects of biology, impact of terrestrial culture on the other cultures we may encounter when we conquer space, etc., without end." Heinlein insisted, however, that speculative fiction "is not fantasy fiction, as it rules out the use of anything as material which violates established scientific fact, laws of nature, call it what you will, i.e. it must be possible to the universe as we know it."[29] In the 1960s, New Wave anthologist and writer Judith Merril used the term in the subtitle of *England Swings SF: Stories of Speculative Fiction* (1968) to distinguish the New Wave from earlier pulp science fiction, though New Wave politics were generally well to the left of Heinlein. In the introduction, Merril calls the book a "collection of science fiction, social criticism, surrealism … what have you" and promises readers a "good trip."

Margaret Atwood has used the term "speculative fiction" to classify her famous novel *The Handmaid's Tale* (1985) because she

says that, though the novel is set in the future, it projects from trends "which are already in motion." She contrasts speculative fiction with science fiction, which she defines as "fiction in which things happen that are not possible today—that depend for instance on advanced space travel, time travel, the discovery of green monsters on other planets or galaxies, or that contain various technologies we have not yet developed."[30] Ursula K. Le Guin, among others, has criticized Atwood's "arbitrarily restrictive definition," which she speculates "seems designed to protect her novels from being relegated to a genre still shunned by hidebound readers, reviewers and prize-awarders." Le Guin claims, on the other hand, that "one of the things" science fiction does is "extrapolate imaginatively from current trends and events to a near-future that's half prediction, half satire," as she believes most of Atwood's novels do.[31] Clearly the use of the term "speculative fiction" has sometimes been a distinction-forging move aimed at rescuing the genre from disparagement by providing a more respectable genealogy, as Heinlein and Atwood did, or by making it a more experimental, boundary-crossing, transgressive force connected to social criticism and surrealism, as Merril exuberantly imagined it. But "science fiction" also has a specific history and constellation of meanings worth remembering in a book on imagining the future of climate change. In what follows, I use both terms but choose "speculative fiction" as the broader frame and include science fiction as a subset of speculative fiction. Speculative fiction is the larger category precisely because it is less defined by boundary-making around the word "science," stretching to encompass related modes such as fantasy and horror, forms of knowledge in excess of white Western science, and more work authored by women and people of color.

In classic science fiction, from the scientific romances and utopian novels of the late nineteenth century through the Hugo Gernsback and John Campbell pulp magazine years, natural disasters dominated stories that imagined disruptions in the weather, though some writers expressed anxieties about scientific experiments going awry and causing catastrophic climate change. Among nineteenth-century climate change novels, Jules Verne's *The Purchase of the North Pole* (1889) is unusual in imagining a geo-engineering scheme hatched by avaricious capitalists in the service of resource extraction. Verne extrapolates from his present, satirizing Americans for trying to capitalize on everything as he imagines them trying to radically alter Earth's climate by changing its axis of rotation to access remote Arctic lands that may hold immense coal reserves, which are "the basis of all our commercial industry." Predicting that before five hundred years are over existing coal reserves will be exhausted, the company justifies making draconian changes to the climate in order to extract this resource. Despite the company's projections, however, a French engineer calculates the force necessary to produce such an effect and predicts it would cause catastrophic disruptions in the earth's crust that would flood most of Asia and other parts of the world. This news causes worldwide panic and efforts to stop the speculative scheme, which is impossible to do because the company has already embarked on the project in an undisclosed location. Luckily, however, the geo-engineer has badly miscalculated, Earth's axis remains unaffected by the firing of the cannon, and in the end Verne reassures the reader that such a man-made change to Earth's axis and climate is impossible because it is "beyond the efforts of humanity" and "our Creator in the system of the universe" will never allow it.

Verne's fiction has enjoyed a long afterlife, frequently reissued in new editions and translations and inspiring many films, from the early days of cinema to the present. One of the earliest ways Verne's work leaped into prominence in popular culture was through the many reprints of his work, including in Hugo Gernsback's pulp magazine *Amazing Stories* (1926–2014), which Gernsback made the home of what he called "scientifiction"—defined as "a charming romance intermingled with scientific fact and prophetic vision." Gernsback was a techno-optimist who fervently believed in scientific progress and justified the existence of a magazine devoted to this "new kind of fiction" by arguing that we "live in a new world" in which "new inventions predicted for us in the scientifiction of today are not at all impossible of realization tomorrow."[32] Verne's work was essential to Gernsback's definition of the genre; he even included a drawing of Verne's gravesite atop each issue's table of contents, claiming access to publication rights from Verne's estate allowed him to disseminate Verne's work to a broad international public. So it was Gernsback who reprinted Verne's "classic" cautionary tale in the September and October issues of *Amazing Stories* during its first year of publication. Ironically, the story's satire of avaricious American capitalists and know-it-all engineers gently undercut the techno-utopianism that *Amazing Stories* usually championed.

Half a century later, British writer J. G. Ballard's four disaster novels of the 1960s, especially *The Burning World* (1964) and *The Drowned World* (1965), which prophetically imagined drought, floods, and other climate changes in most cases caused by industrial pollution and human activity, are usually cited as among the earliest examples of science fictions of climate change. Ballard's work was part of a wave of 1960s books that alerted the

reading public to the climate change crisis, including Carson's *Silent Spring.* Meanwhile, most other science fiction novels of the 1960s that imagined a radically changed climate, such as Brian Aldiss's *Hothouse* (1962) and Philip José Farmer's *Flesh* (1960, rev. 1968), returned to the earlier trope of natural disaster in which comets and other natural forces, rather than humans, are responsible for an altered future climate. In the 1960s, Frank Herbert's *Dune* (1965) was an exception and arguably the most ambitious science fiction novel to deal with climate and ecology. Herbert was a journalist who was influenced by Rachel Carson and spoke at the first Earth Day in Philadelphia in 1970. Herbert's intricate and absorbing world-building, set on the harsh desert planet Arrakis, includes an explicit ecological consciousness, "still suits" that turn human body moisture into water, a conflict between imperialist extractors of profit from a scarce resource and locals who try to leave a small footprint and are suspicious of growth as an unexamined ideal, and other elements that inspired the late, great, speculative fiction writer Octavia E. Butler as well as more recent cli-fi authors such as Bacigalupi.

When it comes to people of color's leadership in imagining the future of climate change, Butler's work is a great place to start. She grew up as a working-class Black girl in Pasadena, California, whose mother worked as a maid and by taking in lodgers after her husband died young of a heart attack. Despite her lack of privilege, Butler went on to become a hugely inspiring and formative force in and beyond the world of science fiction. Butler won several major writing awards for novels such as *Kindred* (1979), which hurls its protagonist back to the time of chattel slavery; the *Xenogenesis* novels, repackaged as *Lilith's Brood,* the story of humans surviving a nuclear war by reproducing with aliens and returning to a devastated Earth to make a

new world; and her two *Parable* novels, especially *Parable of the Sower,* a "cautionary tale" Butler wrote in the late 1980s and early 1990s. Of the latter, Butler once said that "Global Warming is a character in POS" and while writing the sequel, *Parable of the Talents,* she often reminded herself in research notes to "show the 'Greenhouse World.'"[33] Drawing on the vast collection of material Butler left to the Huntington Library in San Marino, California, next to her hometown of Pasadena, upon her untimely death in 2006, I use Butler's research on the greenhouse effect and global warming and on the disasters of these eras and emerging environmental movements to tell the story of emerging scientific research on climate change in the eighties and nineties, how it was covered in the media Butler collected, and how politicians, the fossil fuel industry, and activists responded to that research. I argue in chapter 2 that this working-class Black woman genius's memory work helpfully illuminates this history even as it models an interdisciplinary engagement with the sciences through Butler's study and research.

Although Butler won major science fiction awards, participated extensively in that world, and is usually classified as a science fiction writer, at times she struggled against the limits of the category because she wasn't sure it completely captured all that she was trying to do. Her writing is so original and ambitious that it often pushes the limits of genre. Even though *Kindred,* to name just one notable example, is a time travel novel, it is also a neo-slave narrative with an abundance of historical texture from Butler's extensive research at the Los Angeles Public Library and in Maryland. Butler called herself a "HistoFuturist," a word of her own devising that means someone who extrapolates from the historical and technological past as well as the present in imagining the future. In notes for a speech she gave

about science fiction, she wrote that science fiction "can be one of our methods for looking ahead that I will talk about—not what our future will be, but how we think about it, foresee it."[34] Like Delany, here Butler suggests that science fiction is not really about predicting the future but is rather about the present—how we in the present shape the future that is to come by thinking about it and foreseeing it. In other words, science fiction can help us take hold of the present and think about where things are heading rather than just letting time pass by as our unconscious surround.

But although Butler valued her science fiction community and the genre's usefulness for thinking about and shaping the future, she also saw the utility of the larger umbrella term "speculative fiction." Butler used that term often as well, including in 2004 shortly before her death in a speech she gave at the Black to the Future Science Fiction Festival. Delighted into a "wow" at the existence of a "Black-oriented sf festival," she asked the audience how many of them had "copies of Sheree Thomas's *Dark Matters*" and added that she had especially hoped this crowd would know about Thomas's two "collections of African American speculative fiction of several kinds from as far back as W. E. B. Du Bois." For "this history alone, they're worth having," Butler advised festival participants.[35]

In her groundbreaking 2000 literary anthology, *Dark Matter: Speculative Fiction from the African Diaspora,* editor Sheree Thomas used the term "speculative fiction" to define the genre expansively and to highlight writing that had previously been invisible but was there all along. One striking example is W. E. B. Du Bois's story "The Comet" (1920), which was not considered science fiction or speculative fiction at the time it was published but which is illuminated by situating it in those contexts. The

story takes place in Manhattan after a comet passes over the earth and releases noxious gases that kill everyone in the city except a Black workingman and a rich white woman. As in most of the science fiction stories of the time, climate change in "The Comet" is the result of a natural disaster rather than the handiwork of humans, but Du Bois uses this transformative change to think critically about man-made social institutions such as legal segregation: the splitting of the world into black and white halves as a result of the Supreme Court ruling on Plessy v. Ferguson. In this way, Du Bois uses the narrative device of the future to offer a significant distortion of his present and make readers think critically about how the Manhattan of that era was divided into Black and white.

In this book, I am particularly interested in how scholars, writers, artists, and organizers of color have used the terms "speculative fiction" and the "speculative," as well as others such as "futures" and "futurisms," to describe the visionary work they are doing in imagining the future of climate change. "Afrofuturism" became a keyword in Black studies, cultural studies, and American studies after Mark Dery coined it in his 1994 essay "Black to the Future," where he defined it as "speculative fiction that treats African American themes and addresses African American concerns in the context of 20th-century technoculture—and, more generally, African American signification that appropriates images of technology and a prosthetically enhanced future." The term took hold soon thereafter when several influential scholars, artists, and writers started using it to think together about how people of the African diaspora engaged science, technology, and science fiction. Alondra Nelson, a scholar and author of many award-winning books such as *The Social Life of DNA: Race, Reparations, and Reconciliation After the Genome,* started

an Afrofuturism listserv in the late 1990s that became a digital hub for the community and the movement. Since then, the word has become increasingly common in popular culture, used to encompass a wide variety of future-facing music, film, literature, and art, as in Ytasha Womack's *Afrofuturism: The World of Black Sci-Fi and Fantasy Culture* (2013).

Other futurisms are also at the heart of this book on imagining the future of climate change. In the introduction to *Walking the Clouds: An Anthology of Indigenous Science Fiction,* editor Grace Dillon, like Sheree Thomas in the case of the writers of the Black diaspora, suggests "Indigenous sf is not so new—just overlooked, although largely accompanied by an emerging movement" (2). Dillon makes comparisons to Afrofuturism as she explains: "Writers of Indigenous futurisms sometimes intentionally experiment with, sometimes intentionally dislodge, sometimes merely accompany, but inevitably change the parameters of sf" (3). One important example for Dillon is Leslie Marmon Silko's novel *Almanac of the Dead* (1991), which she reads as a "near future" story built out of elements of the present, in which "the fight for Indigenous land reclamation and tribal sovereignty is a matter of planetary survival" (217). Dillon "opens up sf to reveal Native presence" (2), making the case for understanding Silko's *Almanac* and other Native texts as Indigenous science fictions and arguing that in Native hands sf has the "capacity to envision Native futures, Indigenous hopes, and dreams recovered by rethinking the past in a new framework" (2). In chapter 1, I build on Dillon's and others' work to read Silko as an important intellectual of climate change, connecting her 1990s "near future" vision to Butler's work as well as to the Indigenous activists who were putting climate justice at the forefront of their struggles during the same period. As we shall see, Silko's vision

of movement-building in response to climate change anticipates more recent struggles such as the one over the DAPL, also discussed in chapter 1.

Dillon explores how Indigenous futurisms take a wide variety of cultural forms and often connect to larger movements and worlds. She has done important work herself in making those connections by sponsoring an annual writing contest with a one thousand dollar prize open to "to any emerging writer with an interest in exploring Indigenous issues through the medium of science fiction." Along with others, she also started an "Imagining Indigenous Futurisms" Facebook public group that now has over a thousand members, which provides a space for artists, writers, filmmakers, designers, media makers, activists, and scholars to share insights, exchange information, and highlight work. Indigenous futurisms are at the forefront of efforts to imagine a future of climate change other than that envisioned by the fossil fuel industry and they take many different cultural forms, especially low-cost ones such as videos and photographs captured on cell phones and disseminated across social media such as Facebook and Twitter.

Chicanx and Latinx futurisms also have much to offer in imagining the future of climate change. Thinking about Indigenous people's and people of color's leadership in imagining transnational and international responses to climate change is illuminated by Peruvian American director Alex Rivera's 2008 science fiction film *Sleep Dealer,* which in September 2016 was screened as part of the Climate Change and Climate Justice Film Festival organized by the Institute for the Arts and Humanities at Pennsylvania State University. Widely acclaimed and a favorite on campuses since its release, *Sleep Dealer* is a near future vision of U.S.-Mexico borderlands where transnational

capitalists take advantage of an ingenious new technology to drain the labor from workers and redirect it to U.S. work sites while the workers, called "cybraceros," remain in Mexico. The privatization of water in Mexico by a transnational company that builds a pipeline to redirect rural water to the cities is one of the film's important elements. Although Rivera was surprised to be asked to speak on the topic of climate change, his work on imagining a future off the tracks of transnational capitalism resonates with other work on environmental justice, social movements, and imagining the future by scholars in Latinx and American studies. Curtis Marez, for instance, writes about Rivera's film and other work in *Farmworker Futurism: Speculative Technologies of Resistance* (2016), where he analyzes the "limitations," "contradictions," and "critical edge" of specific farmworker visions of the future as well as what he names "moments of materialist futurity, which asks who can expect a future, who cannot, and why" (11). Marez uses the term "speculative" in his subtitle, connecting farmworker speculative futurisms to Afrofuturism, Chicanafuturism, and Jayna Brown's and Alexis Lothian's juxtaposition of "dominant speculation" with "critical forms of 'speculation' that refuse logics of 'profit and power' in order to 'play, to invent, and to engage in the practice of imagining'" (9). And in the 2017 anthology *Altermundos: Latin@ Speculative Literature, Film, and Popular Culture,* editors Cathryn Merla-Watson and Ben Olguín similarly choose the term "speculative" to capture the "creative and resilient ways in which Latin@ cultural producers since at least the 1970s have continued to repurpose and blend genres of sci-fi and fantasy to defamiliarize the ways in which the past continues to haunt the present and future." Instead of focusing only on short stories and novels, these scholars and artists broaden the sphere of the speculative

to encompass the arts more broadly as well as the social movements that were energized by them.

Another of my models for thinking about the convergence of climate change, speculative fiction, and Indigenous and people of color futurisms is the collection *Octavia's Brood: Science Fiction Stories from Social Justice Movements* (AK Press, 2015), coedited by Walidah Imarisha and adrienne maree brown, which has gained a wide following of readers both inside and outside the university for its conjoining of science fiction and world-making in writing by participants in movements for social change. The book is inspired by and dedicated to Octavia Butler, out of the editors' "fierce longing to have our writing change everyone and everything we touch." In her introduction, Walidah Imarisha explains that the premise of the collection is that "all organizing is science fiction": that "organizers and activists dedicate their lives to creating and envisioning another world, or many other worlds" and in doing so are "engaging in speculative fiction." She further offers the term "visionary fiction" to "distinguish science fiction that has relevance towards building newer, freer worlds from the mainstream strain of science fiction, which most often reinforces dominant narratives of power" (4). All of the writers in the anthology were inspired by the idea of continuing "Butler's legacy of writing visionary fiction," which Imarisha suggests provides "space" that is "vital for any process of decolonization, because the decolonization of the imagination is the most dangerous and subversive form there is" (4). Our answers about the future of climate change must not come solely from the sphere of science and technology, or they will be too narrow, not capacious enough. The work of the imagination is critical and culture is a crucial contributor to that conversation, not just a handmaiden to the gods of science and technology or a

mere reflection of a deeper reality. American studies methodologies, with their emphasis on interdisciplinary thinking and culture's centrality to social movements and the possibility of transformative change, are especially helpful here.[36]

Many of the speculative stories, novels, films, and other futurist cultural forms I center in this study are visionary fictions created by activists and artists who struggle to conceive of worlds that diverge from dominant narratives of power and privilege. They decolonize the imagination by using speculative fiction to break with mainstream stories that center white settlers and fail to imagine deep change. This does not mean that such visionary fictions are optimistic or utopian in a simple way. Often, activists, artists, and writers search for possibilities in the wake of the climate change disaster already upon us rather than turning a blind eye to the many kinds of disaster comprising our current conjuncture's ecological crisis. To understand this, I build on work by science fiction scholars Tom Moylan and Raffaella Baccolini to consider how many critical dystopian texts, especially since the 1990s, offer the glimmer of a utopian horizon as survivors try to create new possibilities in the wake of disaster.[37] I also build on American Studies scholarship that seeks to provide economic and political explanations and contexts for so-called natural disasters such as Hurricane Katrina, which devastated Gulf communities, particularly New Orleans, in 2005. In centering work by Natives and people of color that imagines postdisaster possibilities, I join critics such as Naomi Klein who seek to denaturalize and question the logic of disaster capitalism used by nation-states and corporations to justify the privatization of public services, selling off the environment to the highest bidder, turning places into wastelands, and rendering disposable whole populations.

This book is divided into three chapters that take up three different flashpoints in imagining the future of climate change through visionary speculative fictions and world-making activism. Chapter 1 is entitled "#NoDAPL: Native American and Indigenous Science, Fiction, and Futurisms." The main title refers to the popular 2016 hashtag, #NoDAPL which, in 2016, despite the big-media blackout for most of the year, connected communities and created awareness of the threat posed by the Dakota Access Pipeline to Dakota lands, sacred sites, the Missouri River, and all the creatures who depend on the water. I argue that the skillful mobilization of digital technologies and social media to confront big oil and powerful states are only two examples of robust Indigenous futurisms that encompass many different kinds of high-tech, low-cost cultural productions as well as visionary speculative fictions such as those created by Leslie Marmon Silko and other writers.

The second chapter, "Climate Refugees in the Greenhouse World: Archiving Global Warming with Octavia E. Butler," returns to the 1980s and 1990s, when the problem of global warming first began to be covered widely in newspapers and other media. I argue that through her memory work and archiving activity Butler critically engaged the emerging public climate change conversation and illuminated key blind spots. She did so by centering race, class, and gender and emphasizing the difficult but necessary work of building collectivities in the wake of climate change slow disaster. Butler was ahead of her time in worrying about what she prophetically named "slow disasters," including global warming, which she insisted was not "just an incident like a fire, a flood, or an earthquake" but rather "an ongoing trend—boring, lasting, deadly."[38] Critically commenting on 1980s politicians whom she feared were destroying the

planet due to avaricious obtuseness, she warned, "if you notice a slow disaster you have to pay a lot of money, put forward a lot of effort, and wound entrenched interests—who will stop you if they can."[39] Her 1980s and 1990s memory work around climate change in the public sphere resonates with the work of the emerging climate justice movement even as her body of writing and archiving activity raise difficult questions about colonization, community, and coalition-building in imagining the future of climate change through visionary fiction.

The final chapter, "Climate Change as a World Problem: Shaping Change in the Wake of Disaster," begins and ends by focusing on climate justice activist and science fiction writer adrienne maree brown, coeditor of *Octavia's Brood,* who has long used Butler's writing to do powerful work with social movements made up of Indigenous youth, people of color, and white activists. In this last chapter, I emphasize how Indigenous people and people of color have been at the forefront of doing the work of the imagination when it comes to climate justice from the 1990s to the present, in both their movement-building and their speculative and visionary stories, novels, films, web series, and other forms of culture.