TRAVERSING THE RIFT: CULTIVATING CLIMATE CHANGE LITERACY THROUGH THEATRICAL PERFORMANCE

by

LYDIA A. BOROWICZ

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Student: Lydia A. Borowicz

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This thesis has been accepted and approved in partial fulfillment of the requirements for the Master of Arts degree in the Department of Theatre Arts by:

Theresa J. May	Chair
Stephanie LeMenager	Member
Nelson Barre	Member

and

Janet Woodruff-Borden	Vice Provost and Dean of the Graduate School

Original approval signatures are on file with the University of Oregon Graduate School.

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THESIS ABSTRACT

Lydia A. Borowicz

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Climate change is a persistent and growing threat to the well-being of both humans and nonhuman species, and little action has been taken to halt it. It is imperative the public gains a sufficient level of climate change literacy to be able to take action to mitigate climate change. Theatrical performance offers audiences diverse ways to engage with climate change through both improving scientific understanding and connecting with climate change's effects through live, embodied performance. Employing the National Oceanic and Atmospheric Administration's tenets of climate literacy, I examine how climate change plays (specifically Steve Waters' *The Contingency Plan*, Chantal Bilodeau's *Sila*, Duncan Macmillan and Chris Rapley's *2071*, and E.M. Lewis's *Magellanica*) can cultivate improved climate change literacy in audiences. Halting climate change will require not just climate science knowledge but a shift in values toward an ecologically sustainable future, and theatre offers vital space and tools for reimagining that future.

CURRICULUM VITAE

NAME OF AUTHOR: Lydia A. Borowicz

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
Marlboro College, Marlboro, Vermont

DEGREES AWARDED:

Master of Arts, Theatre Arts, 2019, University of Oregon
Bachelor of Arts, 2007, Theatre, Marlboro College

AREAS OF SPECIAL INTEREST:

Ecocriticism in Performance
Climate Change Theatre

PROFESSIONAL EXPERIENCE:

Teaching assistant, Department of Theatre Arts, University of Oregon, Eugene, 2016-2018
Outreach Educator, Museum of Natural and Cultural History, Eugene, Oregon, 2017-2018

GRANTS, AWARDS, AND HONORS:

Graduate Teaching Fellowship, Theatre, 2016-2018
Arnold/Isabelle/Rupert Marks Scholarship: University of Oregon, 2017

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CHAPTER I

INTRODUCTION

In many ways, climate change is the most pressing environmental concern our planet is facing today. Climate change threatens humanity's well-being and potentially our very survival, not to mention the survival of the other species we share the earth with. While anthropogenic climate change is now a widely accepted theory in both scientific circles and the general public, it is still debated in some groups, and action to combat it has been glacially slow. The reasons for this are varied and complex, with many scholars pointing to capitalism as well as political and social power structures as key forces impeding change.[1] Although climate science can explain the material causes of climate change and predict how its effects may affect both human and nonhuman populations, anthropogenic climate change is ultimately a problem that will require social solutions based on a shared vision of the future.

While scientists have been modeling climate predictions and working to convince the public of the veracity of the science behind climate change, it falls to the arts and humanities to examine the implications of this science and help to shift public perceptions of climate change so that we can take the step forward to create a sustainable climate for both humans and all other species.[2] In 2005, Bill McKibben, founder of the grassroots organization 350.org, wrote an article titled, "What the Warming World Needs Now Is Art, Sweet Art," in which he says about climate change: "though we know about

[1] Naomi Klein's book and documentary of the same name, *This Changes Everything: Capitalism vs the Climate*, provides an in-depth examination of capitalism's role in sustaining climate change.

[2] While Stacy Alaimo's challenge to the usefulness of the term "sustainable" in *Exposed: Environmental Politics and Pleasures in Posthuman Times* (see pages 169-178) bears further exploration, I employ "sustainable" as a common term to indicate social and material conditions that promote biodiversity and healthy conditions for all humans.

it, we don't *know* about it. It hasn't registered in our gut; it isn't part of our culture. Where are the books? The poems? The plays? The goddamn operas?" (McKibben). Fortunately, McKibben's call for increased engagement with climate change in the arts and humanities has begun to be answered, including artists and writers who have created theatrical performances that address climate change in a variety of formats, from plays to operas, dance, art installations, and music.

Ecocriticism generates an entry point for interrogating these works, and the manner in which theatre and performance scholars such as Wendy Arons, Una Chaudhuri, Downing Cless, and Theresa May have applied an ecocritical lens to theatre provides a framework for ways that theatre's foundation in storytelling and live, embodied performance renders it a particularly effective tool in reshaping perceptions of humanity's relationship to the environment.[3] The arts have always served as a society's barometer, reflecting shifts in social thinking and values, and are often at the forefront of social change, as they offer a society a visceral way to confront, embody, and reimagine social issues. Combatting climate change requires climate change literacy and action in the public, and performance offers tools to engage audiences with climate change and improve climate change literacy.

The capacity for the arts to communicate about climate change in a unique and effective way has been noted by scientists. Playwright Chantal Bilodeau describes a plea by Earth Institute director Jeffery D. Sachs "urging artists of all disciplines to join scientists in their efforts to personalize climate science and disseminate it to a wider audience" and notes that Gavin Schmidt, a climate modeler for NASA, believes that "the

[3] May's "Beyond Bambi: Toward a Dangerous Ecocriticism in Theatre Studies" develops how theatre's materiality moves ecocriticism's literary foundation into embodied practice.

only way we are going to be galvanized into action around climate change is through personal connections to stories and metaphors" ("A Climate" 62-63). With climate change a continually growing threat to humanity, traditional science communication has clearly not been sufficient to halt the persistent progression of climate change. The arts and humanities offer a way for the public to engage with climate change beyond a scientific understanding and explore how climate change will impact them personally and as citizens of local and global communities. By staging the complexities of climate change, theatrical performance connects climate science to embodied experience and cultivates climate change literacy in audiences.

CLIMATE LITERACY

In 2009, the National Oceanic and Atmospheric Administration (NOAA), published an eighteen-page document called *Climate Literacy: The Essential Principles of Climate Science*, which outlines the main principles of climate science literacy and its importance. This publication defines climate science literacy as "an understanding of your influence on climate and climate's influence on you and society" (Climate Literacy 3). Until the very latter part of the twentieth century, the general public had no real need to understand climate science, as humans weren't seen as having any significant impact on the Earth's climate. With the discoveries of climate change and the hole in the ozone layer, people realized that human activity could have measurable effects on the world's climate and that those effects could seriously endanger the lives and well-being of all humans, and thus the need for climate science literacy became apparent. While the terms "global warming" and "climate change" are often used interchangeably, "climate change"

calls more attention to the wide range of effects that the warming climate will bring, including variability in weather patterns, as not all areas of the globe will warm equally. Accordingly, "climate change" is the more appropriate term to use when discussing climate literacy and social responses to climate change. NOAA's publication lists four qualifications for a climate-literate person: "understands the essential principles of Earth's climate system, knows how to assess scientifically credible information about climate, communicates about climate and climate change in a meaningful way, and is able to make informed and responsible decisions with regard to actions that may affect climate" (Climate Literacy 3). These qualifications emphasize not just a basic scientific understanding of climate science, but how it interacts with human society, paving the way for action to be taken to combat climate change as well as build resilience against climate change's effects.

As Susanna Priest notes in her book, *Communicating Climate Change: The Path Forward*, science communication research is a relatively recent field, and climate change communication is an even newer subdiscipline (xi). Climate literacy in the public will depend on effective climate change communication. With roots in the social sciences, climate change communication can offer an evidence-based approach and chart the effectiveness of different tactics and strategies in communicating with the public about climate change. Of particular pertinence to theatre, Priest asserts that "science communication research has often been too focused on the individual rather than the social (18). Theatre's nature as a social event has the ability to aid in climate change communication in a way that targets a community rather than the individual. Priest notes that successful social movements reinforce collective identity (163). This is difficult to

promote with a topic as diffuse as climate. However, thinking of climate change as a social justice issue may be the best way to inspire change. Priest says, "Human beings are social, communication is critical to that characteristic, and climate change needs collective social action" (164). By capitalizing on performance as a shared experience, theatre can aid in improving climate literacy through effective climate change communication.

With the progression of climate change, climate literacy has increased in importance. A climate-literate public will be able to make choices and take action regarding climate change. A 2016 study from the Yale Program on Climate Change Communication found that "more than half of those who are interested in global warming or think the issue is important "rarely" or "never" talk about it with family and friends," (Maibach et al. 1), which shows that even those who have a higher level of understanding of climate change have still not met all the tenets of climate literacy. The same study found that "fewer than half of Americans say they hear global warming discussed in the media … "at least once a week" or even "at least once a month" and that "nearly seven in ten Americans hear other people they know discussing global warming only "several times a year" or less often" (Maibach et al. 4-5). This dearth of discussion of global warming in social arenas keeps climate change from being recognized as an extremely pressing issue. Climate literacy empowers individuals to make effective choices to combat climate change and to be community leaders in the fight against climate change, whether that means being able to talk with friends and family about it, or step into a more formal leadership role. NOAA's publication on climate science literacy says, "Society needs citizens who understand the climate system and know how to apply

that knowledge in their careers and in their engagement as active members of their communities" (Climate Literacy 4). This application of climate science and engagement with how climate change will affect communities is vital if society is going to progress toward a sustainable future.

CLIMATE CHANGE IN THEATRE

Since McKibben's call for the arts to participate in climate change discourse, plays and performances that examine elements of climate change have been on the rise.[4] While climate change plays are beginning to be written and performed around the world, this paper specifically focuses on four plays written and performed in the United Kingdom and the United States as case studies for how theatre can improve climate change literacy. Further development of this idea should take into consideration how other countries and cultures are addressing climate change in theatre, as well as the ways in which performances outside the scope of traditional theatre can contribute to climate change literacy. While the number of climate change-related plays has certainly been growing, especially in United Kingdom, United States, Canada, and Australia, few have had multiple productions. In the United States, climate change theatre has yet to be produced in commercial theatres or be picked up by multiple regional theatres.

Most climate change plays either focus on using scientists as characters to explain climate change or take place in a dystopian future, and while these approaches were a natural response to early climate change discourse, they ultimately reinforce a narrow

[4] Climate change has now featured in ballets, operas, theatre for young audiences, puppet shows, music compositions, and more. A list of climate change plays produced through 2016 can be found at the Artists and Climate Change website: https://artistsandclimatechange.com/2014/11/01/creating-a-list-of-climate-change-plays/

understanding of climate change. The dystopian model has been a pervasive element of ecotheatre, forecasting catastrophic futures if ecological action isn't taken, and while apocalyptic narratives may lend themselves well to theatre due to their inherent dramatic content, they may not be the most effective way to inspire ecological action.[5] While some plays have begun to experiment with dramatic forms, most still rely on an Aristotelian arc, following a linear narrative trajectory. As climate change theatre continues to grow, more diversity in approaches to climate change is needed to effect change and make climate change theatre accessible to wider audiences.

While an ecocritical lens in theatre has been employed for several decades now, climate change theatre is still a relatively recent topic. Environmental concerns in theatre have largely existed on the periphery of mainstream theatre in the United States, even as other social justice issues came to the forefront in plays and performances.

The early 1990s saw the first articles and books on ecotheatre in the United States being published as theatre started responding to rising concerns over environmental issues. Early ecotheatre focused on the material aspects of theatre making. In 1994, Larry Fried and Theresa May published *Greening Up Our Houses*, the first book on "green" practices in theatre, and in it, Fried and May give practical applications for how ecological sensibilities can be used in all areas of the production-making process. Since that publication, ecoscenography has grown in popularity, theatre buildings are getting LEED certifications (Leadership in Energy and Environmental Design), and recycling practices in theatre production and administration are improving. Ecoscenography has challenged designers to create sets using found objects, reused set pieces, and recyclable

[5] See Chaudhuri – "There Must Be A Lot of Fish in That Lake" for an early examination of dystopian ecotheatre.

materials. While most theatres still have a long way to go in implementing sustainable material practices, an ecological mindset is slowly developing as designers and technicians begin to embrace environmentally-friendly methods.

Early ecotheatre scholarship began to advocate for ecocriticism in theatre and specifically looked at how relationships between humans and land are represented on stage. While a brief mention of climate change in connection with theatre can be seen as early as 1992, theatrical performance has been slow to engage meaningfully with climate change.[6] Most early ecological plays focus on broad environmental concerns, which may connect with climate change, but the plays rarely directly confront climate change itself. Early ecocriticism in theatre often focused on analysis of human connections with the environment in plays that were not specifically focused on environmental issues, or looked at plays that addressed pollution, pesticides, and broader environmental justice concerns.[7]

In 1994, Una Chaudhuri noted that Jose Rivera's play *Marisol* "exemplifies one of the most common forms of ecological theatre, namely, an underlying and dystopic ecological condition pervading the world of the play," and she says, "a largely negative ecological vision permeates the theater of this century" ("There Must Be" 23). These dystopian visions were a response to increased attention in the media to environmental concerns, such as the hole in the ozone layer, acid rain, pollution, and the loss of rainforests. Dystopian narratives have continued despite communication research showing that apocalypticism is not the most effective way to engage the public in

[6] See Jacobson – "Green Theatre" for a mention of the greenhouse effect (16).
[7] Cless ties ecotheatre to grassroots theatre and Augusto Boal's Theatre of the Oppressed in support of environmental justice in "Eco-Theatre, USA" (79-80).

environmental issues.[8] The draw of dystopian stories has a long history, and will likely continue as climate change predictions become increasingly dire, but ecocriticism can provide alternative ways of thinking about human interactions with the environment that might prove useful.

One of the most influential ideas to come from the environmental humanities is to question the long-held nature/culture separation that has proven fundamental to an extractive culture. In a 1994 essay, Chaudhuri situates this divide in nineteenth century humanism and its ties to industrialization ("There Must Be" 23). Wendy Arons takes up this idea again in her 2010 essay, "Beyond the Nature/Culture Divide," in which she cites studies from the biophysical sciences that tie cultural evolution to biological evolution. Arons raises questions of what these biological ties might mean for theatre historiography that has traditionally ignored human connections to the nonhuman world, and calls for a rewriting of theatre history to think about how the nonhuman world has shaped human cultural productions ("Beyond the Nature/Culture" 156-157). While many indigenous cultures around the world have a fundamental cultural understanding of humanity's inherent connections to the nonhuman world, this idea is still antithetical to the ways that contemporary capitalistic societies function. Overcoming the nature/culture divide has called for ecological thinking in the arts and humanities, and ideas of "entanglements" now frequently appear in environmental humanities texts. Environmental humanities scholars outside of theatre's discipline have begun to reference performance in their works, raising questions of how human interactions with the nonhuman world are

[8] See chapter five's discussion of tempered apocalyptic rhetoric.

performed or represented.[9] From speaking out against the idea of a nature/culture divide to an embrace of entangled ecological relationships, many ecotheatre and environmental humanities scholars have taken up the call to rethink how humanity's ecological connections are represented in performance. These connections and relationships become especially salient in climate change theatre as playwrights try to communicate the impact extractive actions have on both human and nonhuman life.

As Arons points out in 2010, "only a handful of theatre scholars and historians to date have attempted similar studies of the relationship of theatre to the environment" ("Beyond the Nature/Culture" 149). Since that time, a few additional books have been published, but there is still a large lacuna in the research, and additional theoretical frameworks are needed.[10] One of the most useful frameworks has been what May terms "ecodramaturgy," or "play-making … that puts ecological reciprocity and community at the centre [sic] of its theatrical and thematic intent," which offers a framework for examining how a play is situated ecologically ("Kneading Marie Clements" 6). May and Arons later note specific challenges that ecodramaturgy confronts, such as the scale of environmental stories, connections to globalization, and the representation of nonhuman animals, along with how these ideas are used in both historical ecodramatrugy and the materiality of theatrical production (Arons and May 5-6). Ecodramaturgy looks not only at the ecological content of the play, but also at the ecological relationship with where the play is taking place. It brings into question ideas of scale, both spatial and temporal,

[9] See Stacy Alaimo's *Exposed: Environmental Politics and Pleasures in Posthuman Times*, Donna Haraway's *Staying With the Trouble: Making Kin in the Chthulucene*, and the edited collection *Arts of Living on a Damaged Planet.*

[10] Of the most relevant to research on climate change theatre is Wendy Arons and Theresa J. May's edited collection, *Readings in Performance and Ecology*, and Una Chaudhuri and Shonni Enelow's book *Research Theatre, Climate Change, and the Ecocide Project*.

"conceiving of drama in relation to earth processes" (Arons and May 4). An ecodramaturgical lens applied to climate change theatre asks for all scales to be considered, from the immediate and personal effects of climate change, to the global changes that will occur over generations. It also reinforces the idea of ecological entanglements, asking "how theater and performance might shock us into recognition of the inescapable interdependencies and shared contingencies" (Arons and May 6). These "inescapable interdependencies" are explored in climate change theatre, as human effects on the climate turn into embodied consequences of climate change. Ecodramaturgy provides a bridge between ecocriticism and the process of creating a live performance. It raises questions of how ecological connections are embodied and communicated to an audience.

By embodying the effects of climate change, ecodramaturgy underscores the literal connections between humans and the environment, a "programmatic resistance to the use of nature as metaphor" where material relationships can be foregrounded. (Chaudhuri "There Must Be" 29). While this focus on literalism is often a useful way to think about how theatre engages with ecology, it runs into challenges when confronted with the complexity and scale of climate change and the way theatre might be conceived of in the Anthropocene. As Una Chaudhuri and Shonni Enelow explore in *Research Theatre, Climate Change, and The Ecocide Project*, removing theatre from "the cultural space of theatre" runs the risk of romanticizing nature and separating it from culture. Chaudhuri and Enelow state:

> The realization that "culture" *is* (part of) the nature of our species, and its converse, that the non-human world is both shaped by and experienced through

> elements of this culture (notably language), is not, for contemporary ecocriticism, a dead end but just the opposite: the emergence of new arena and new set of modalities for ecological and ecocritical practice (29).

This complex relationship between human culture and the nonhuman world reflects a way of thinking that is closely tied to the development of the Anthropocene, an era where humans have had global geological impact on the Earth, and follows an ecocritical trend toward exploring nonhuman agency through object-oriented ontology, vital materialism, and posthuman imaginings. These frames provide the next step for looking at how climate change theatre may require a different approach than other forms of ecotheatre. Chaudhuri and Enelow theorize,

> We think of this sub-genre as an up-dated ecotheatre, dedicated to putting the vast resources of live, embodied performance at the service of the program of radical reimagination called for by the perilous predicament we find our species – and others – in today (2).

While each play that addresses climate change offers unique possibilities for improving climate change literacy, the "radical reimagination" called for by Chaudhuri and Enelow pushes theatre to move beyond dystopian narratives and the use of scientist characters to find where the tools of live performance can inspire audiences to take action to fight climate change.

The complexity and scale of climate change have made it a difficult topic for playwrights to grapple with. Novelist Amitav Ghosh sees this same problem in literature. In commenting on real weather events as opposed to those in surrealist or magical realist novels, he says, "to treat them as magical or surreal would be to rob them of precisely the

quality that makes them so urgently compelling – which is that they are actually happening on this earth, at this time" (Ghosh 27). While theatre may have more flexibility in addressing climate change than the novel, both playwrights and novelists run into difficulty in expressing human relationships to climate change. In theatre, this may mean that traditional dramatic forms following one sustained narrative are not sufficient to engage with climate change, and that further experiments may be needed. At the end of his book, Ghosh writes of his hopes for the next generation:

> That they will be able to transcend the isolation in which humanity was entrapped in the time of its derangement; that they will rediscover their kinship with other beings, and that this vision, at once new and ancient, will find expression in a transformed and renewed art and literature (162).

In this call for new forms of art and literature, there is a clear need for theatre that reflects the complexities of living in a world of anthropogenic climate change that has been recognized but not stopped for decades. As Chaudhuri asserts, "Ecological victory will require a transvaluation so profound as to be nearly unimaginable at present. And in this the arts and humanities – including the theater – must play a role" ("There Must Be" 25). As playwrights continue to find new ways to address these ideas, an ecocritical lens will continue to shift as well in considering how plays are reacting to climate change and moving society toward action.

Climate change has influenced all aspects of culture in America. The arts and humanities have addressed climate change in novels, poetry, films, scholarly works, and many other formats, and each brings unique disciplinary features. As a live and embodied art form, theatre offers an experiential access point for climate change that

transcends purely intellectual understandings of climate change. May notes, "Skills like radical empathy, deep listening, collective embodied practice, and a sense of community – all central to theatre as a way of knowing – are essential to what climate sociologist Kari Norgaard calls the 'revolution of our shared imagination'" ("Radical Empathy"). Through evoking empathy, plays can connect audiences with impacts of climate change and offer reimagined futures. Audiences can participate in teaching moments on stage, and experience imagined futures based on varied climate change outcomes. All of these access points occur as parts of shared experiences with other audience members and offer a range of opportunities for building community and empathy. While theatre and other live performances might not reach as large of an audience as some films or novels, they offer potentially moving and memorable experiences through which to better understand climate change.

CLIMATE CHANGE LITERACY IN PERFORMANCE

NOAA's climate literacy document provides a framework for thinking about how climate change communication might be used in theatrical performance. Each tenet provides an important aspect of climate literacy and moves from scientific understanding to synthesis and meaning. While theatre's strengths are not generally found in communicating scientific and factual information, theatre's narrative devices and live performance can make science engaging in a way that journalism may not. Climate change plays may be most effective in helping audiences to find personal meaning in climate change and recognize that they are members of many communities, both on local

and global scales. In this way, theatre offers engagement with climate change not only through the content of the play, but also through the theatre-going experience.

Using ecodramaturgy as a lens to think about climate literacy, it becomes clear that climate change theatre poses many questions. Climate change's complexity is reflected in the way it is presented on stage, and ecological relationships come to the forefront. While climate literacy's tenets are largely anthropocentric, ecodramaturgy can help to think about how decentering the human might aid in climate literacy and help audiences understand climate change at an emotional and embodied level, not just intellectually.

Climate change plays can offer audiences engagement with each of the tenets of climate literacy. Rather than just using one form of communication, theatre speaks on many levels, from spoken text, to body language, to design elements, to the environment the play is produced in. Audiences can be engaged visually, auditorily, somatically, mentally, emotionally, and more. All of these forms of communication may increase understanding of climate change and form impactful memories. By using communication theories and ecodramaturgy to analyze the means and effectiveness of climate change representation in theatre, theatre's role as a vital tool to cultivate climate change literacy can be seen.

THE PLAYS

In exploring how climate change is represented in theatrical performance, this paper uses four plays with climate change as central to their narrative to provide examples of a range of approaches of how climate science can effectively be

communicated through theatre. Premiering between 2009 and 2018, these plays reflect contemporary attitudes toward climate change in theatre. The plays take place between the 1980s and the near future, and thus show both the causes and effects of climate change affecting the world today. While dystopian climate plays set in the more distant future can certainly improve climate literacy in audiences, they are often focused more heavily on severe climate change impacts that will occur if climate change's progression is not halted. The plays examined here focus on characters trying to find ways to halt or slow climate change before it reaches catastrophic levels, and thus interact more deeply with all four tenets of climate change literacy. Not all climate change plays engage specifically with climate science, but for the purposes of this interrogation of climate change theatre's role in improving climate change literacy in audiences, plays that directly engage with climate science were selected. All four plays explore climate science through the use of a climate scientist as a character and the effects of climate change, but do so using varied dramatic structures.

Each play was performed on a theatrical stage and supported by an established theatre company in either the United Kingdom (*The Contingency Plan* and *2071*) or the United States (*Sila* and *Magellanica*). This limits the scope of this paper to traditional plays in order to engage with the ways in which theatre is representing climate change on stage. Chapters five and six will address possibilities for other forms of theatrical explorations of climate change. While focusing on plays created in the United States and the United Kingdom also limits the scope of this research, these plays reflect contemporary discussions of climate change in the United States and United Kingdom. Few climate change plays written in non-English languages have been translated to

English, and most of the English language climate change plays originate in Australia, Canada, the United Kingdom, and the United States. Theatre in the United Kingdom has been far less reluctant to engage with climate change than that in the United States, and it is only in the last few years that the number of climate change plays in the United States has begun to rival those in the United Kingdom. Similarly, in the United Kingdom, climate change plays have had performances in some of London's larger non-commercial theatres, whereas in the United States, climate change plays have struggled to be produced in larger theatres. While this paper focuses on plays produced in the United States and United Kingdom, further exploration of this topic should reflect the global nature of climate change and be expanded to examine performances from non-English speaking countries and especially those from populations projected to be the most impacted by climate change.

The plays selected are similar in their use of a climate change scientist as a character and their engagement with climate science. All were produced within the last decade in the United States or the United Kingdom and given full staged productions. However, the plays all vary greatly in their approaches and make use of different dramatic structures. While each play delivers a message about the need to address climate change, they all use a different tactic. While some focus more heavily on communicating science and others more heavily on climate change effects, all engage with each tenet in some way and provide valuable comparisons. Because of these similarities and differences, these four plays offer useful points of comparison when examining the many ways in which climate change literacy can be improved through theatrical performance.

A summary of each full-length play's plot and characters, along with its use of climate change is outlined below. Each play will be discussed in subsequent chapters in connection with one of the tenets of climate change literacy outlined in NOAA's document.

The Contingency Plan

The Contingency Plan, by Steve Waters, is comprised of two sequential plays: *On the Beach*, and *Resilience*. Premiering in tandem in 2009 at the Bush Theatre in London, the plays were later adapted for BBC radio and broadcast that same year. *The Contingency Plan* shows a near future for England as it faces catastrophic flooding due to climate change. The plays move between discussing the global nature of climate change, with ice sheets melting and causing sea level rise, to the local impacts of that sea level rise as communities face floods. Both plays center around Will, a glaciologist who has recently returned to England after doing research on the melting of the West Antarctic Ice Sheet. In *On the Beach*, he returns home to visit his parents in Norfolk, along with Sarika, a senior Civil Servant, whom he has recently started dating. His father had left his work as a scientist decades previously but had never revealed the cause. Instead, he has been holed up at their home, making observations about the birds and marsh land their home sits on. He has developed deeply intimate knowledge about the local ecology and is able to predict the strength of storms based on the birds he observes. He is deeply distrustful of the government and is upset to find out that Will has returned to England to help advise the government on policies. The play ends with an approaching storm of unprecedented magnitude and him refusing to leave their house by the shore. *Resilience*

follows Will and Sarika as they engage with both new and established politicians. Will tries to convince Chris, the Minister for Climate Change, that drastic and immediate action is needed if they are to protect England's cities and towns from the massive floods he is predicting. This action is impeded by Colin, the Chief Government Scientific Advisor, who recommends proceeding at a more cautious, measured pace. The second act takes place a few months later as decisions are being made about whether or not to evacuate coastal areas due to an upcoming storm. Debate rages, and Will is ultimately proved right as calls come in documenting unprecedented storm surges and flooding.

Sila

Sila, by Chantal Bilodeau, premiered in 2014 at Underground Railway Theater in Cambridge, Massachusetts. In the play, characters from a variety of backgrounds approach climate change and its effects through different lenses, all centered on Baffin Island in the Canadian Arctic, where effects of climate change are already being felt. Although the play premiered in Massachusetts, Bilodeau is originally from Canada, and travelled to Baffin Island to conduct research and speak with community members there (Bilodeau "In Search" 1). *Sila* provides a more comprehensive examination of climate change than most other plays have attempted. The play connects indigenous characters with those from a Western, settler-colonial background and with non-human characters. Native characters include a mother and adult daughter from an Inuk family who have lived on Baffin Island for generations, an Inuk Elder, and Nuliajuk, Inuk Goddess of the Ocean and the Underworld. Non-indigenous characters include a Québécois climate scientist, and English Canadian Coast Guard officer, and a Québécois Coast Guard

officer. Other non-human characters represented are a mother polar bear and her daughter, with appearances by additional sea animals. Over the course of the play, the characters all encounter effects of climate change, and ideas of loss are explored. *Sila* emphasizes the importance of an ecological mindset when discussing climate change, and the interconnections present in its narrative serve to mirror the complexity of the earth's climate system.

2071

2071, by climate scientist Chris Rapley and playwright Duncan Macmillan, is a seventy-five-minute solo performance that was first performed in 2014 in London at the Royal Court Theatre. In the performance, Rapley delivers a dramatized lecture that explains the science behind climate change. Macmillan worked with Rapley to structure the performance into a narrative, including the story of Rapley's decision to become a climate scientist and his growing concern for the future. In 2071, Rapley's granddaughter will be the same age as he was during the performance, and in the play, he wonders what the world will be like at that point. Rapley explains to the audience how the climate system works, outlines the dangers of climate change, and concludes by speaking of the future.

Magellanica

E.M. Lewis's *Magellanica* premiered at Artists Repertory Theatre (Artists Rep) in Portland, Oregon in 2018. It was a five-and-a-half-hour long performance with five parts, each running approximately forty-five to seventy minutes, with breaks in between

each section, and a longer dinner break after the third part. The play follows a group of six scientists accompanied by two expedition leaders as they are stationed at the South Pole research station in Antarctica for over eight months. The international group of scientists include an American and a Russian atmospheric scientist, a Bulgarian cartographer, a Chinese-American physicist, a Norwegian ornithologist, and an English glaciologist. Set in 1986, the play centers around the discovery of the hole in the ozone layer and the beginning steps of the discovery of anthropogenic climate change. While based in scientific discoveries, the narrative is driven by the relationships that form among the characters, allowing the play to feel intimate and expansive at the same time. Based on its extended running time and overarching content, the play was marketed as an "epic" and its episodic structure referred to as binge-watching theatre ("Magellanica"). While *Magellanica's* narrative centers on the discovery of the hole in the ozone layer, Lewis makes a point of tying this story to today's challenge of overcoming climate change, modelling the hole in the ozone layer as an environmental success story.

Each of these plays presents a different strength and a different perspective on how we approach climate change. The variety of dramatic structures that these plays utilize, from a solo performance to a five-part epic with ten characters, demonstrates different storytelling techniques that can be used to engage audiences. While there are now many more climate change plays available to analyze than there were even a decade ago, these four plays were chosen in part due to each play's specific exploration of climate science and its use of a climate scientist as a character. These four plays that specifically engage with both climate science and the effects of climate change give

insight into the ways playwrights have grappled with climate change communication and literacy in their plays. As climate change becomes more prevalent in theatre and performance, this reliance on using a scientist to explain climate science is beginning to diminish, and further research will be needed to explore ways in which climate change can be represented on stage without playwrights feeling the need to explain climate science.

In addition to the four plays examined in each chapter, at the end of section five, the Climate Change Theatre Action project, which took place in 2015 and 2017, is explored as an example of an alternative to full-length dramatic narratives that rely on explanations of climate science. The project is built on global perspectives and local engagement, and provides ways for climate change to be embodied on stage without the need for extended narrative development. Its structural flexibility offers a look at some important considerations for the future of climate change theatre, especially when examining the ways climate change theatre can reach greater audiences and inspire them to take action.

Climate change's complexity and scale mean that no one play will be the definitive climate change play and no climate change play is going to radically change the world. However, each play offers a critical intervention and shows a different perspective and insight into this complicated issue. Each interaction an audience member has with climate change theatre serves to increase their climate change literacy and move them toward a willingness to take action.

CHAPTER II

CLIMATE LITERACY: UNDERSTANDING CLIMATE SCIENCE

NOAA's document prioritizes that a climate-literate person "understands the essential principles of Earth's climate system" (Climate Literacy). Without a fundamental understanding of how climate functions, subsequent aspects of climate literacy cannot be advanced. It is nearly impossible to be able to communicate about climate change meaningfully or assess information about climate change without having at least general knowledge about how anthropogenic climate change has developed. Climate change is an exceedingly complicated field of study, encompassing atmospheric, geographic, and ocean systems, and even climate scientists struggle to understand and model all the interactions among the involved systems. However, this deep level of understanding is not necessary to be able to engage meaningfully with climate change. A basic understanding of general concepts, such as the fundamental idea that human activities have put greenhouse gases into the atmosphere at an unprecedented speed, causing heat to become trapped, should suffice to allow members of the public to make informed decisions when considering climate change.

CLIMATE SCIENCE

NOAA's climate literacy publication lists the following essential principles of climate science:

1. The sun is the primary source of energy for Earth's climate system.
2. Climate is regulated by complex interactions among components of the Earth system.

3. Life on Earth depends on, is shaped by, and affects climate.
4. Climate varies over space and time through both natural and man-made processes.
5. Our understanding of the climate system is improved through observations, theoretical studies, and modeling.
6. Human activities are impacting the climate system.
7. Climate change will have consequences for the Earth system and human lives. (Climate Literacy 10-16)

None of these principles require advanced scientific knowledge or training to be understood, and rather than focusing on specific scientific facts, climate literacy hinges on a general ecological understanding of how climate is affected by all the parts of a complex system in which humans now play a significant role. The essential principles of climate science are numbered, moving from a general understanding of the natural forces at work in the climate system to focusing on how humans are impacting the climate and will be impacted by climate change. Apart from simply understanding how greenhouse gases have caused heat to become trapped, it is crucial that the public understands the predicted effects of climate change. Without that understanding, climate change holds little meaning in most people's lives. Many effects of climate change have already begun to be seen: melting ice, ocean acidification, and disrupted weather patterns, alongside loss of biodiversity, disruptions to food supplies, droughts and water shortages, and sea level rise leading to a loss of land. If climate change is not curbed, these impacts may eventually be felt by all humans, and the public must be able to make the connection between the effects of climate change and their role in producing those effects.

Climate science's complexity often creates a barrier to non-scientists. Climate science includes atmospheric, geographic, and oceanic systems, and scientists still do not have an accurate model of all the interactions that affect the Earth's climate. Because of this complexity, communicating climate science requires a variety of approaches. Those communicating climate science must consider who their audience is, be aware of confirmation bias, and act within general public understanding of science (Priest 47-49). While most plays that focus on climate change shy away from in-depth explorations of climate science, each provides a different way of explaining the underlying scientific principles. Because of this, it is unlikely that any one play would create a fully climate literate audience member; however, when produced as part of a broader conversation on climate, theatrical plays can use storytelling and examples to reinforce scientific understanding of the climate. Through language choices, relationships, and dramatic structure, plays can offer different insights and understandings of climate science for audiences.

SCIENTIFIC LANGUAGE IN *THE CONTINGENCY PLAN*

Like many climate change plays, *The Contingency Plan* relies on scientists as characters to explain climate science in a narrative context. While some climate science is communicated through conversations between two climate scientists in the play, the most effective explanations come from scientists interpreting climate research for the politicians who must make policy decisions based on the information they receive. In *The Contingency Plan's* second play, *Resilience*, Will and Colin try different methods of clarifying some of the more complex aspects of climate research to Sarika, Tessa, and

Chris, each in hopes of influencing policy decisions. While these conversations drive the narrative forward, they also serve to communicate climate science to audiences as the politicians stand in for the public.

Early on, Chris, the newly appointed Minister for Climate Change, expresses frustration with the way a report on climate change is written. It is full of acronyms for various organizations and scientific terms, and Chris has to rely on someone who has been in the department for several years to translate the acronyms for him. He asks, "Is there a strain of Tourette's where you spout acronyms rather than obscenities? 'The EUETS is implemented by the ERU who distribute EUAs.' Translation, please" (Waters 106). His frustration mimics the alienation the public might feel at being presented with climate science that is unintelligible to those not well-versed in its vocabulary. Chris also expresses surprise at much of the science in the report that he had previously been unaware of, even though he feels he is well-educated. After reading the report he comments, "Yeah, learned a lot from this when the acronyms abated. Page ten, learned that the atmosphere was a fluid, which was a bit of a shock" (Waters 106). This then leads to a sarcastic rant of increasing exasperation revolving around the dire warnings present in the report, and he ends with an easily-relatable and humorous metaphor as he declares, "am I alone in finding all this profoundly dispiriting? It's like going to your GP with a sniff and getting diagnosed with Avian Flu" (Waters 106). Having a character like Chris, one who needs to be introduced to many of the tenets of climate change, gives an audience a character to relate to and be guided by.

Like the audience, Chris must be convinced by one of the two climate scientists in the play on how to interpret climate science data. Both scientists present explanations of

the data and attempt to sway him to follow their recommended course of action, and while Will is ultimately successful in persuading Chris that his interpretation is the one to take action on, he goes through a learning curve in how to present scientific research to non-scientists. When he first presents his findings, he pulls out a sheaf of documents and starts discussing meteorological models and complicated data and promptly confuses those around him. Over the course of the following dialogue, he learns to communicate his findings through straightforward language and metaphorical examples. When outlining why melting ice in Antarctica is a problem for England, he says, "If you pour water in the bath it doesn't stay under the tap, Minister; the equilibrium of the ocean, of all oceans everywhere is disrupted" (Waters 126). This example gives Chris a familiar image with which to better comprehend the scientific concept. As Will goes on to describe the amount of water that would be released from the melting of the West Antarctic Ice Sheet, he forgoes scientific data and pulls out a map, using familiar landmarks to illustrate what areas would be impacted by various amounts of sea level rise. By the time he describes how London would be impacted by flooding, Chris has a clear understanding of the potential scale of impacts from climate change. Will's ability to effectively communicate his research means that Chris, and the audience along with him, is able to understand the causes and impacts of climate change.

SILA ILLUSTRATES ECOLOGICAL IMPACTS

Sila upends the model of using climate scientists as characters to explain climate science. While *Sila* does use a climate scientist as a character, that character is ultimately the one who learns the most over the course of the play. Rather than simply serving to

impart knowledge about climate science, Jean experiences the ecological impacts of climate change through his interactions with the other characters. Rather than relying on scientific jargon and explanations like in *The Contingency Plan*, *Sila* brings the complexities of climate science to life by embodying the ecological connections among all the characters and the land.

The play takes place on Baffin Island, a large island located between the Canadian mainland and Greenland. Baffin Island forms the traditional lands of many Inuit communities, and is an area already heavily impacted by climate change. Levels of sea ice are diminishing, and the ice and permafrost that normally cover the land are melting.[11] In the first part of the play, Bilodeau sets up the objectives for each of the main characters. Leanna is working to protect her people and their way of life, which is being threatened by the melting ice. She states, "Our hunters can't feed their families, Veronica. Our roads and houses are sinking, and our traditional knowledge is becoming obsolete" (Bilodeau 27). Veronica is a teacher and spoken-word artist, and is trying to hold her family together, raising her teenage son and looking for help from her mother. Bilodeau based Leanna's character on Inuit climate change activist Sheila Watt-Cloutier, while Inuit spoken-word artist Taqralik Partridge influenced the development of Veronica's character. Bilodeau also uses two of Partridge's poems for Veronica's spoken-word performances in the play. By drawing inspiration from these two women, Bilodeau acknowledges the real-life issues facing the communities of Baffin Island and prioritizes the agency of the members of those communities. Leanna and Veronica's

[11] See the Nunavut Climate Change Centre's website for information on how Baffin Island communities are planning for climate change's impacts: https://climatechangenunavut.ca/en/understanding-climate-change/climate-change-nunavut

objectives to protect their family and community are made more urgent because of their ties to the lived experience of Inuit community members.

As a visitor to the area, Jean's objectives are different from Leanna's and Veronica's. He is there to collect data on ice melting, and is frustrated by the political maneuvering he encounters. He complains, "What happened to science for its own sake? Science to understand the world? Everything has to be APPLIED nowadays" (Bilodeau 33). He wants to be able to conduct his research and not have to form relationships with those around him. The mother polar bear is trying to raise her daughter and teach her to survive amid the changing ice. Raphaël is looking forward to the birth of his son, while Thomas is working to get a port built. Ultimately, each of these characters' objectives are impacted by the effects of climate change. The melting ice negatively impacts each character in a different way, and gives audiences wide-ranging examples of the ways in which one ecological change can affect many different areas of life.

As Jean interacts with all these characters, his focus widens from simply fixating on the data about the ice melt to experiencing what those changes in the ice mean for those who live there. Each character is impacted by a death rooted in climate change: Veronica's son commits suicide, the daughter polar bear drowns, and a researcher is killed when his boat sinks. Jean witnesses these events and is changed by them, reaching out to Leanna and Veronica at the end of the play and offering to help with Leanna's work.

While *Sila* spends little time discussing climate science, the complexity of the Earth's climate system is modelled by the complexity of the ecological connections present in just one community. Audiences gain an understanding of how life on earth is

impacted by changes in the climate and that the consequences of climate change will have a profound effect on all segments of a community, both human and non-human.

SCIENCE ON STAGE IN *2071*

Using a lecture format, *2071* draws on Chris Rapley's background as a climate scientist and applies a technical approach to communicating the complexity of climate change to an audience. Rapley baldly states, "I'm here to communicate the results of the science, their implications, and the options we have before us" (Macmillan and Rapley 15). While this format is not the most inherently theatrical of approaches, director of the Royal Court Theatre, Katie Mitchell, ultimately felt it was the best way to communicate climate science to an audience. She says, "We tried every possible way of communicating it. We played scenes. We did agit-prop. We tried surrealism and symbolism. We threw everything that theatre can throw at a subject in order to find a way of representing it… We just couldn't find a form for it" (Trueman 14). In lieu of creating a fictional play, Mitchell chose to put a scientist on stage to communicate his work with the help of a playwright. While other playwrights have found ways to communicate elements of climate science, none are as thorough as 2071, which spends the majority of its performance explaining the principles of climate change. Mitchell's choice puts climate science itself at the forefront of the production.

While Rapley and Macmillan weave a narrative into the lecture as a way to engage the audience, the actual science is explained in a factual and straightforward manner. Rather than trying to explain the intricate details of the scientific research, Rapley describes why climate science is complex by giving an overview of the main

components. He explains Earth's system by listing the components with a brief definition, such as "The Atmosphere – the layers of gas surrounding the planet" and "The Cryosphere – the ice on land and sea, the snow and the permafrost" but rather than giving an in depth account of each component's role in the climate system, he focuses on their interactions, stating:

> The system behaves in complex and often counterintuitive ways, but the fundamental principles of it are quite simple: its component parts interact with each other, exchanging energy in ways that operate in an overall Dynamic Balance… even a small change in one component can trigger a chain of consequences in the other parts" (Macmillan and Rapley 18).

The audience is not required to have a full understanding of how the climate functions in order to grasp the idea of climate as a system that requires the balancing of all components and one that can be easily unbalanced.

While Rapley relies on some scientific language, he avoids complex jargon that might risk alienating his audience. In each section that explicates an element of climate science, he summarizes the argument at the end and ties it to his overall analysis, ensuring that the audience is following his argument and scientific explanation. After speaking about how sea level rise is measured and outcomes are predicted, he clarifies with, "it indicates that the Dynamic Energy Balance of the climate system has been disrupted," again returning to his earlier explanation (Macmillan and Rapley 20). This approach helps an audience become more familiar with the language of climate science while gaining broad comprehension of the subject matter and having the general concepts reinforced through repetition and synthesis.

To increase understanding of climate science, *2071* makes use of images and videos that appear projected behind Rapley as he speaks. These appear as blue text and images on a black background, lending a scientific and technological aesthetic quality to the imagery. Graphs and maps with data points serve to reinforce Rapley's statements that rely on scientific data and images of the Earth seen from different angles emphasize the global impacts of climate change. As a dramatized lecture, Rapley's performance is made more theatrical through the use of visual elements, and offers a better chance of engaging an audience than if he were simply speaking to an audience, and yet the images are monochromatic to avoid distracting an audience with stimuli. As a communication strategy, using visual representations of the data should help audience members to follow Rapley's argument.

Without stating it outright, Rapley addresses elements of climate change denial and skepticism in *2071*. Climate change denial and skepticism can take many forms; climate skeptics may deny that the climate is changing at all or that there are anthropogenic causes to climate change. Climate change denial can also take the form of a defeatist attitude, not believing that humans are capable of reversing the changes. By explicitly not using the words "climate change denial," Rapley avoids confirmation bias and can instead direct the audience toward his intended message.

Rapley declares that scientists have dismissed non-anthropogenic causes as possible generators of global warming, stamping out possible doubts in the audience's mind. He emphasizes the consensus of the large majority of climate scientists and explains that the Intergovernmental Panel on Climate Change (IPCC)'s Assessment Report was created by the world's foremost experts and is "arguably the most audited

scientific document and possibly the most audited document – in history" (Macmillan and Rapley 30). After summarizing the document's conclusions, he quotes it, saying, "Warming of the climate system is unequivocal… In other words, there is evidence that ALL the warming that has occurred since 1950 is due to human actions – due to us" (Macmillan and Rapley 32). This statement leaves little room for skepticism and climate change denial, and instead reaffirms the narrative that climate change is based in anthropogenic causes.

While *2071* is written as a theatrical performance, its lecture-based structure dictates its approach to communicating climate science to its audiences. Employing Chris Rapley's authority as a climate scientist, the performance is rooted in helping the audience understand and engage with climate science. More than any fictional narrative-based play, *2071* is focused on effectively communicating climate science to an audience, and yet the play still relies on narrative elements to help the audience follow the cause and effect trajectory of climate change. While a lecture format allows the work to be entirely devoted to communicating climate science, it was still deemed necessary to frame the facts with narrative structure to engage audiences.

SCIENTIFIC DISCOVERY AND EXPERIENCING CLIMATE CHANGE IN *MAGELLANICA*

In a similar vein to *The Contingency Plan*, *Magellanica* introduces aspects of climate science to the audience through dialogue, but rather than using scientists to explain climate science to non-scientist characters, E.M. Lewis relies on monologues and conversations between the scientists as they debate their findings and make discoveries.

This introduces audiences to scientific language, but Lewis avoids complex jargon and data, ensuring the science is intelligible and engaging. By watching scientists make discoveries, audiences are drawn into the science and get to experience the discovery along with the character.

In a chilling moment in Part III, William Huffington, the English glaciologist, narrates his thoughts about a discovery he has made. He has placed markers on the glacier and has tracked their movement and discovered an early sign of global warming, as the glacier has advanced much further than predicted. In direct-address to the audience, he says, "I found something. Maybe. I don't know. … I've been looking down at the data we've been collecting on the glaciers. And it isn't what I thought it would be at all. … I think something's wrong" (Lewis 111). While he still has many questions about his finding, part of him recognizes the impact of the discovery, and he quotes T.S. Eliot, saying, "This is the way the world ends, this is the way the world ends, this is the way the world…" (Lewis 111). He rubs out his cigarette with his foot, and the lights fade. This moment is the first real reference to climate change in the play, and its framing gives the scene weight. Without any reference to climate change or global warming, the audience understands what the glacier's movement means, and that meaning is underscored by the pauses between lines Lewis writes into the script as Huffington reflects while he smokes. By writing this scene as an intimate monologue, Lewis enables the audience to share in the character's revelation and feel the impact of the discovery along with him.

After checking on his glacier markers, William Huffington goes on to work with May Zhou to confirm his findings. He isn't willing to just accept the data, and tries to

find other explanations for the numbers he's seeing. He knows that the movement of the glacier might be a sign of global warming, and shows his concern when he says, "We're at the coldest, darkest place on earth, at the coldest, darkest time of year, when the glaciers should be at their most static. And I'm seeing ice streams moving" (Lewis 239). While most of the science in the play focuses on the hole in the ozone layer, Huffington's discovery in 1986 of already visible effects of global warming shows audiences that climate change science has a longer history than is usually addressed. The fact that humans have known about the greenhouse effect for so long and have been seeing results of climate change for decades begs the question as to why so little action has been taken.

In addition to addressing climate change in its content, *Magellanica*'s dramatic structure mirrors some of the elements of climate change. This reflects a recent movement toward experimenting with dramatic structure in climate change-focused performance. *Magellanica*'s form and content embody some of the elements of climate change that are most difficult for humans to grasp. Theorist Timothy Morton terms climate change a hyperobject, which he defines as "massively distributed entities that can be thought and computed, but not directly touched or seen" (Poisoned Ground 37). Hyperobjects function on a scale that is beyond direct human experience, and yet theatre may be able to offer a glimpse into the scale that hyperobjects exist within. Because climate cannot be directly experienced, most plays focus on presenting the effects of climate change. *Magellanica* however, plays with climate change's long timeline both in its extended running time and by having a character interact with time. The play's five and a half hour running time pushes the boundaries of conventional performance. As Wendy Arons and Theresa May note, "Ecological stories take place on a scale beyond the

human, and so even when a playwright strives to foreground ecological issues on stage, the stories are hard to contain" (4). While *Magellanica* is certainly not the first play to employ this scale, the long running time and episodic structure are effectively employed to give the play the quality of an epic. The play's setting in Antarctica, one of the most inaccessible and sublime places on the planet, also emphasizes an epic scale. Arons and May explain, "Ecodramaturgy, in conceiving of drama in relation to earth processes, stretches any notion of epic theater to the far reaches of human attention" (4). As climate change has local and personal causes and effects, it also functions on a global scale both through time and space, and theatre is well-placed to experiment with embodying the various scales of climate change. Within an intimate, live encounter, theatrical performance has the ability to explore how climate change interacts with both time and space.

In *Magellanica*, Todor Kozlek, a cartographer, becomes unstuck from time in what writer Jaclyn Pryor terms a "time slip," which she defines as "moments in live performance in which normative conceptions of time fail, or fall away, and the spectator or artist experiences an alternative, or queer, temporality" (Pryor 9). After Kozlek dies, he returns but is separated from his surroundings. Although the other characters are unaware of his presence, Kozlek moves about the space and speaks to them. With his new perspective on time, he attempts to complete his giant map of Antarctica that will include both changes over time and impacts from humans. He says, "I am having trouble trying to draw all the dimensions that I want to write onto it. A flat map is not enough. A globe is not enough. I try to add chronology" (Lewis 228). His discovery of time as an important element in his map changes how he thinks about his position. When William

Huffington describes the ice streams he is seeing from the glacier moving, Kozlek adds this movement to his map. His map expands to all sides of the stage and spills into the audience as he gives audience members pieces of the map to hold. By engaging the audience, Kozlek brings the audience into his experience of being unstuck from time and trying to grapple with the changes happening in Antarctica. No longer bound to linear time, Kozlek is able to realize the importance of time in how humans now interact with the Earth, an element that is increasingly being reflected in art created in the Anthropocene.

While this step away from realism is a different approach to understanding climate science through performance, it allows audiences to experience some of the elements of climate change rather than simply having an intellectual understanding of the scientific theories.

While *The Contingency Plan* and *2071* explicitly explain climate science to audiences, *Sila* and *Magellanica* provide an experiential understanding of how climate change functions. Each play offers a unique approach to climate science communication while still relying on using climate scientists as characters to aid with that communication. By placing science within a narrative context, audience members that are not typically science-oriented may find explanations of climate science more appealing and easier to understand. However, with the science of climate change becoming increasingly accepted in the public, theatre's role as a live experience may ultimately be better suited for offering audiences new ways to experience climate change as a way to gain a personal understanding of climate science.

While climate change literacy requires that people have a basic understanding of how climate change occurs and its effects, its second tenet also necessitates a level of scientific literacy so that information on climate change can be assessed properly. Since climate change has proven to be a controversial public issue, if those creating theatrical performances want to aid in enhancing climate change literacy, they have a responsibility to consider how they are staging climate science and ensure that the scientific information being presented is accurate and credible. While tackling scientific literacy may be too large a job for most climate change plays, theatre's embodied storytelling offers a way for audiences to have extended engagement with scientists, even as fictional characters, and experience the scientific process in action.

CHAPTER III

CLIMATE LITERACY: ASSESSING SCIENTIFIC INFORMATION

The second tenet of climate change literacy dictates that a climate literate person "knows how to assess scientifically credible information about climate" (Climate Literacy 3). This ability to assess scientific information on climate change is rooted in science literacy and trust in climate scientists and those interpreting their scientific research. This trust has been eroded in recent years with scientific misinformation being spread on the internet and supported by special interest groups. It is more essential now than ever for theatre to engage in this social issue and ensure science is being accurately represented. Proper evaluation of information about the climate is necessary in order for effective action to be taken to curb climate change, and without an understanding of the scientific process and a level of trust in that process, the public may have difficulties assessing the credibility of conflicting information on climate change.

How climate science is represented in performance both reflects and has the ability to change how audiences view and understand climate science. By presenting scientific concepts in an understandable and engaging way, climate change plays may give audience members the ability to better assess information on climate change outside of the theatre. The embodied representation of scientists on stage can also influence how the public reacts to climate scientists and their research. The portrayal of scientists on stage offer audiences a look into the process of how scientists conduct their research and interpret their findings, as well as how they must reevaluate their hypotheses when presented with data that does not align with their original suppositions. The inherent challenges of the scientific process can be embodied on stage and audiences can gain an

experiential understanding. While theatre may not provide a simple answer for how to properly assess information on climate change, it can offer valuable insights into the scientific process and engage critical thinking about scientific issues.

SCIENCE LITERACY

Science literacy has many facets. A science-literate person has knowledge of scientific facts, but also understands the scientific process and how to evaluate scientific information. This includes comprehending how and why the scientific method is used, from how scientists make observations and hypotheses, to how they create and conduct experiments, to how they evaluate and use data and the results of those experiments. As a specialist in science communication and literacy, Susanna Priest asserts that science literacy must go far beyond a basic grasp of certain scientific facts and encompass an understanding of the scientific process:

> Part of the background knowledge needed to identify valid scientific claims is familiarity with a number of important ideas, such as recognition that some uncertainty always surrounds specific scientific claims, understanding the nature of scientific specialization and expertise, familiarity with the range of available methodological approaches…and awareness that the conduct of science is itself a social process (Priest 118).

Each of these elements allows a discerning member of the public to assess scientific information's credibility and usefulness and make decisions regarding actions to be taken.

Scientific jargon often makes use of words that hold different meaning outside of a scientific context. Science literacy requires an understanding of how scientists use words such as "theory" and "significant" in reports or articles. To a non-science literate person, "theory" may sound as though scientists are guessing about their findings, but within a scientific framework, a theory denotes a tested and reliable explanation. The word "uncertainty" has turned out to be problematic when discussing climate change. All science has some degree of uncertainty, and the "p-value" is used in reports to quantify the level of scientific uncertainty within a dataset. To the public though, the word "uncertainty" sounds as if scientists are unsure about the claims they are making. A more science-literate public will be able to avoid misunderstanding scientific reports by learning how scientists use these words. Likewise, scientists and those interpreting scientific research such as journalists and science writers must be aware of how members of the public might perceive the use of certain words and be sure to clarify how those words are being used in their reports.

TRUSTING SCIENCE AND SCIENTISTS

In recent years, the American public has faced widespread misinformation and mistrust of science in the media. Science's validity has been challenged more than ever as the internet has provided a platform for anyone to disseminate information, even if that information has no grounding in fact. This has progressed to the point where a worldwide series of marches and rallies with the slogan "March for Science" took place in 2017 with over a million participants estimated (March for Science). Picket signs with slogans such as "What do we want? Evidence Based Science. When do we want it?

After peer review" and "I Can't Believe I'm Marching For Facts" proclaimed the need for renewed trust in science, scientists, and the scientific method, as well as increased science literacy (Awesome Daily Staff). Stanford University professor of the history of science, Robert Proctor, says, "The march is pretty unprecedented in terms of the scale and breadth of the scientific community that's involved. … But this is even broader in the sense that there's a broader perception of a massive attack on sacred notions of truth that are sacred to the scientific community" (Mooney). Proctor points out that while scientists have rallied around specific issues in the past, rarely has the validity of science itself been questioned on such a wide scale.

The March for Science was partly in response to statements and policies made by President Trump's administration, including the use of the phrase "alternative facts," which sent the scientific community into a furor. Science historian Naomi Oreskes comments, "I think a rally like this is extremely important to making clear to the public, what's going on … Not because I think it will make Donald Trump change his mind" (Mooney). While ideally, elected officials will have high rates of climate change literacy, Oreskes speaks to the need for science literacy in the general public, as it is ultimately citizens who push for social change. The march was a call for citizens to demand evidence-based scientific policies and for broad support of science as a vital aspect of society.

REPRESENTATIONS OF SCIENCE

With this unprecedented call for improved literacy and trust in science, theatre-makers must examine how science and scientists are represented in performance and ask

what message is being sent to the public. With climate change being one of the most controversial fields of science, caution must be used in how climate science is portrayed on stage.

In a 2016 article in the *New Yorker*, Dr. Atul Gawande outlines the challenges facing the scientific community, citing how since 1974 public trust in science has been decreasing in the U.S. (Gawande). He outlines the rise of pseudoscience, which has had greater reach using the internet as a tool, and has undermined the credibility of the scientific community. Research has found that actively debunking these pseudoscience myths actually does more to propagate them, as repeating the misinformation helps it to stick in someone's mind. To combat this, Gawande supports "asserting the true facts of good science" and "including the narrative that supports them" as narrative-supported facts have a stronger effect on the public (Gawande). Gawande also notes that scientists as individual figures "can be famously bull-headed, overly enamored of pet theories, dismissive of new evidence, and heedless of their fallibility" but that science is actually a social network and that "as a community endeavor, it is beautifully self-correcting" (Gawande). While mistrust of science and scientists has risen to such a point that a nationwide March for Science was deemed necessary, the techniques Gawande outlines may be a way to start redirecting public opinion back to trust in science and scientific methods. When looking at representations of individual scientists in performance, it is important to also consider their role in the scientific community and how that reciprocal role may be influencing public perceptions as well. In her book *Science on Stage*, Kirsten Shepherd-Barr of Oxford University notes, "science plays either directly or indirectly engage this notion of the social responsibility of the scientist" (25).

Acknowledging that scientists often feel pressures to meet that level of social responsibility might be the key to increasing public trust in scientists. This is a way for audiences and scientists to connect over pursuing a common goal.

A majority of climate change plays that attempt to engage with climate science feature a climate scientist as a leading character, as in the case of *Sila*, *The Contingency Plan,* and *Magellanica*. Two other works have taken a different approach, putting actual climate scientists Chris Rapley (*2071*) and Stephen Emmott (*Ten Billion*) on stage, theatricalizing their scientific presentations on anthropogenic climate change. Because of their status as climate scientists, Rapley and Emmott bring expertise and gravitas to their theatrical characterizations. Whether fictional characters or living scientists, these varied representations of climate offer the opportunity to connect audiences with deeper and more nuanced understandings of climate science and the humans researching it, thus closing the communication gap and improving climate science literacy. Rather than reinforcing stereotyped portrayals of scientists, embodied representations of scientists by both real and fictional scientists in performance allows for scientists to be seen as complex human beings.

A pitfall of creating characters that fall into more stereotyped portrayals is how those stereotypes can limit the depth of a characterization. Instead of offering a fully rounded and nuanced characterization, characters can appear shallow or one-sided, detracting from an audience's view of scientists as real and complex people. Kirsten Shepherd-Barr says, "there is something very appealing in the quest of the scientist; audiences are drawn to the lone crusader's neoromantic pursuit of truth, knowledge, and beauty" (3). However, this romanticized view of scientists categorizes them and lumps

all scientists together. Shepherd-Barr goes on to describe some of the thematic portrayals of scientists in plays as "the scientist as overreacher, the clash of religion versus science, the scientist as hero or villain, and the application of scientific knowledge" (25). While these themes may make it easier for an audience to categorize a scientist as a character, they run the risk of pigeonholing that character and not allowing for the complexities that a real scientist exhibits.

In light of the current uptick in mistrust of science and scientists, theatre artists must consider how their portrayals of scientists on stage fit into the discourse on science in society. Choices in characterizations can help reinforce or dispel this mistrust, and can examine whether that mistrust is warranted or not. In attempting to bridge the gap between scientific consensus on climate change and the public's perceptions of it, allowing an audience to have a look at how a real scientist functions may be one way to build that trust back up.

SCIENCE POLICY IN *THE CONTINGENCY PLAN*

In *The Contingency Plan*, Steve Waters offers a look at three different climate scientists. In both *On the Beach* and *Resilience*, the plays' plots revolve around governmental policy regarding climate change. While the plays do discuss some specific elements of climate science, their primary focus on how the impacts of that science will be felt in England.

In *On the Beach*, Will has returned home to visit his parents after being in Antarctica. He gets into an argument with his father, Robin, an ex-glaciologist, over his upcoming job working with the government on how to respond to climate change. Both

Will and Robin have stepped outside of the traditional role of the scientist in academic research. Robin has withdrawn from the scientific and academic worlds and has been using his observational skills at his home on the coast, noting shifts in local flora and fauna due to changing weather patterns. Robin's daily life provides a different look at how a scientist might function; by stepping outside the traditional scientific community, Robin gives an audience a creative look at how science can be used outside of academic research. Will, on the other hand, has chosen to take his work to the government in hopes of influencing policy. Although both are well-intentioned, they have distinctly different ideas of what actions should be taken with their research.

Resilience steps further away from raw science and moves toward the applications of climate science in public policy. Here, two scientists, Will and Colin, battle over the correct course of action, both hoping to sway the policy makers to their sides. When Chris is frustrated with the lack of progress in mitigating the effects of climate change, he says, "I need *my* scientist. Someone fresh, someone who speaks my language, someone ahead of the curve" (Waters 111). This scientist ahead of the curve turns out to be Will, as he emphasizes an urgent need for action and his findings are ultimately correct. The play gives an excellent example of the difficulties in translating scientific knowledge into action, and how the personal foibles of each person can stand in the way of that progress. Colin loses some of his sway with the administration in part due to his personality and inability to open his mind to scientific findings that do not fit within his established understanding of climate change.

The Contingency Plan shows variation in the roles scientists can play and how their personalities inform how they interact with science. The audience sees an emphasis

on hard science, a desire to use scientific knowledge to protect people, and how the desire for power and notoriety can stand in the way of scientific objectivity.

TYPES OF KNOWLEDGE IN *SILA*

In *Sila*, the scientific process is augmented by traditional ecological knowledge (TEK), and both offer ways of knowing about natural world. While *Sila* features a climate scientist, other forms of knowledge about the environment play a significant role. Unlike in many other climate change plays that have been produced, Chantal Bilodeau draws upon TEK along with stories and legends from the people being most affected by climate change. TEK's value has been slowly gaining in recognition in settler-colonial cultures, but more action still needs to be taken. Gleb Raygorodetsky, who works with the United Nations University's Traditional Knowledge Initiative (UNU-TKI), says, "One significant manifestation of the marginalization of indigenous peoples from the climate change policy and decision-making is the paucity of references in the global climate change discourse to the existing traditional knowledge on climate change," and notes that while the UNU-TKI has begun to partner with the IPCC, more steps are needed to increase awareness (Raygorodetsky). Bilodeau brings these issues to the forefront and examines where different types of knowledge come into conflict and where they have the ability to support one another.

TEK is introduced through Tulugaq, an Inuk elder. Jean enlists Tulugaq to take him out onto the ice so he can conduct his research. Tulugaq agrees, but first tries to impress upon Jean the importance of TEK. He says, "That is Inuit qaujimajatuqangit. Inuit traditional knowledge. … Arctic is not just numbers. Arctic is stories. …

Observation, experience" (Bilodeau 52). He has lived his whole life on that land and knows it intimately. The traditional stories he has learned guide him in understanding the environment. Jean agrees to follow Tulugaq's orders, but later shows frustration when the reality fails to meet his expectations. Tulugaq has repeatedly postponed going out on the ice, and when they finally do go out, he then calls for them to turn back, saying "I made a mistake. I thought today was right. Today is not right. I can feel" (Bilodeau 72). Tulugaq's intimate knowledge of the ice means he can spot slight changes and predict trends. Jean is unwilling to accept this and insists that the ice is fine. After they encounter the Mama polar bear, Jean runs and falls through the ice, proving Tulugaq's point. Even with his scientific equipment, Jean does not have the depth of knowledge of the area that Tulugaq does, but it takes him falling through the ice to learn to respect the form of knowledge that Tulugaq carries.

When Jean falls into the water he starts drowning, and while underwater, he meets Nuliajuk, the Inuit goddess of the ocean. She grabs on to him with her long hair and calls him and all of humanity weak for not protecting her and for harming the ocean, and before she releases him Jean vows to protect her (Bilodeau 86). His conversation with her is the catalyst for him to go to Veronica and connect with her. Nuliajuk shows him that people are inherently connected to their environment and that humans must protect that relationship. Jean takes action based on this experience, rather than on scientific data, and offers a different representation of a scientist. While Jean is at first a fairly stereotypical scientist, focused only on his work, his transformation is an example of the change needed to approach climate change creatively and from multiple angles.

Sila shows audiences that scientific and environmental knowledge can come from many sources and that all can be credible (May *Climate*). TEK is built from generations of knowledge and experience in an ecosystem, where observations of the environment have led to a deep knowledge of the relationships and interconnections between living and nonliving elements. Scientific knowledge is built from a specific process based on observation, experimentation, and evidence. While "alternative facts" can be problematic and misleading, varied epistemologies can bring fresh ways to look at a problem. Climate change's complexity will require a range of solutions in order to curb its progression, and integrating the knowledge that various cultures hold may provide more effective solutions.

2071: SCIENTIST AS ACTOR

Scientists today face increased pressure to communicate their research and be more socially involved. In their book, *Science in Public*, Jane Gregory and Steve Miller note, "in the recent past, many scientists looked at involvement in the popularization of science as something that might damage their career; now, they are being told … that they have no less than a duty to communicate with the public about their work" (1). This push to connect with the public has seen increased presence from scientists in all forms of the media and arts. While most theatre performances have relied on fictional portrayals of climate change scientists, two performances have taken actual scientists and placed them on stage, forming a true collaboration between scientists and artists. Both of these shows starring scientists took the format of dramatized lectures, rather than plays with multiple characters, and were spearheaded by the Royal Court Theatre's director, Katie

Mitchell. In 2012, Stephen Emmott presented *Ten Billion*, which later was turned into a book and a film. In 2014, Chris Rapley and Duncan Macmillan created *2071*. Both performances received mixed reviews, in some part due to their unexpected format, as both dramatized lectures were presented in theatres by theatre companies.

Stephen Emmott's *Ten Billion,* created in collaboration between him and director Katie Mitchell, focuses on overpopulation as the root cause of climate change and other environmental concerns. Emmott's specialty is in computer modelling, making him particularly well-equipped to create visual representations of impending crises. In an interview, Emmott discusses how he had to revise his talk to make it less formal and more conversational in order to connect with audiences (McKie). Mitchell helped him to set the tempo for the piece and to give it dramatic structure. Mitchell's choice to have an actual scientist perform in both *Ten Billion* and *2071* was an unusual one, but she felt that having an actual scientist on stage would add credibility to the message. She says, "If you put the real scientist there, you can't duck what he's saying. … It's not possible to have contact with a real scientist and not be changed" (Trueman 14). Emmott ends his talk on a dramatic note, saying "I think we're fucked" (Emmott 216). These words, out of the mouth of an actual scientist, give the statement more weight than if they were written into a fictional play. The scientist on stage presents a figure of authority and expertise. However, soon after the play was performed, Emmott reformatted it into a book, which was then criticized for its exaggerations and inaccuracies. One reviewer commented, "this is typical of the book: lots of strong assertions, no analysis and lots of factual mistakes" (Goodall). Emmott later revised the book to resolve some of these inaccuracies. It is unclear at what point in the development process these errors occurred,

but perhaps in hopes of dramatizing science, scientific accuracy took a backseat. Exaggeration is certainly a risk when hoping to dramatize climate change, and accuracy with language is essential, especially when one of the goals is to improve the audience's climate change literacy. The scientific process relies on peer review; perhaps that strategy ought to be implemented for performances dealing with climate change as well, with an emphasis being placed on dramaturgical research.

Following the experience of creating *Ten Billion*, Katie Mitchell chose a similar format when she decided that the Royal Court Theatre should tackle climate change as theatrical subject matter again, and once more she supported a dramatized lecture with a scientist on stage. When creating *2071*, Chris Rapley collaborated with playwright Duncan Macmillan to write the piece, and together, they framed it within a story of how the world will be when Rapley's granddaughter is an adult. Although the talk is scientific and data-driven, personal stories woven in help to illustrate Rapley's points, and give the audience an intimate view into him as a person, not just a scientist, ultimately making him more relatable. While relatability is important to the performance, Rapley's authority as a scientist is paramount. The second sentence of the show begins, "As a climate scientist," affirming Rapley's status as an expert right away, and is followed by a list of his accomplishments as a scientist and as the head of scientific organizations. (Macmillan and Rapley 14). Rapley asserts that his work has enabled him to "see and assess things for himself," giving him credibility as a primary source for the data he is about to present (Macmillan and Rapley 14). *2071* presents a slightly more optimistic viewpoint than *Ten Billion*, leaving the audience with a bit more hope, yet also received mixed reviews. Some applauded the show's message and scientific rigor. Others found

it dry and dull, to the point where one reviewer called it "one of the most outrageously anti-theatrical events I've ever attended" (Coveney). Rapley was criticized for his dry delivery and difficulty with enunciation, two common difficulties when putting non-actors on stage. In the play, Rapley even notes that "As a scientist I try to remain objective and dispassionate," qualities that are certainly not favorable in an actor (Macmillan and Rapley 26).

This desire to theatricalize a lecture seems to prove problematic, as neither *2071* nor *Ten Billion* was entirely successful. This is somewhat surprising, considering how popular podcasts and TED talks have become, so perhaps the negative reactions were partially due to audience expectations when attending the theatre. Reframing such an event might be helpful, or finding other ways to make it more performative and engaging. It seems to be a difficult balance, to make climate change material engaging without losing scientific accuracy. Placing scientists on stage may have given credibility to the shows, but critical feedback shows the scientists might have benefitted from some additional acting training and perhaps more variety in staging choices. The following chapter will explore the ways in which narrative structure can engage audiences without losing scientific credibility.

MAGELLANICA EXPLORES THE SCIENTIFIC PROCESS

Magellanica's premise is based in scientific exploration as a group of scientists travel to Antarctica, each intending to conduct their own research. With scientists numbering six out of the eight characters, audiences get an in-depth look at a scientist's

world, and as each scientist comes up against challenges in their research and must find ways to overcome them, audiences see the scientific process in action.

Often, the public's exposure to scientific research comes in the form of reports and articles on the results of research. Non-scientists rarely experience the process scientists go through in choosing how to conduct their research and in trying to analyze the data they collect. In *Magellanica*, scientists must reevaluate their work and make adjustments frequently, something that is rarely discussed in news articles about a scientific discovery. When William Huffington discovers that the markers on a glacier he has been tracking are giving him data points he was not expecting, he goes out into the Antarctic cold and wind in order to confirm that his markers are functioning properly. He is willing to risk his own personal safety in order to get accurate data for his work. Adam, the expedition leader, is at first unwilling to let the scientists go out onto the ice. He is not a scientist, and does not place the same value on the research as the scientists do. Vadik and Morgan realize the importance of their discovery about the hole in the ozone layer, and they argue with Adam, trying to convince him to let them set up tests out on the ice. Vadik says, "We must find truth. Data, new data, is only way. Satellite images do not capture. … We need more information. And we need it from here, or all is waste, and implication of what we are studying..." (Lewis 151). When Adam relents, the audience witnesses the dangers the scientists are willing to face as they traverse the ice in search of accurate data.

As the play progresses, the characters in *Magellanica* build relationships with each other. Although they mostly start out as strangers, by the end of the play they have become friends and colleagues. They bond through the shared experience of being

isolated from the rest of society for eight months and having to rely on each other to meet their physical, mental, and social needs. The scientists support each other as they struggle with their research, and at the same time, personal conflict creates friction in working spaces, a reminder that scientists are not immune from everyday human irritations. When Huffington is struggling to make sense of the anomalous data he has collected, May Zhou jumps in to assist and offer another viewpoint. This reinforces the idea that science is a social process and requires a network of people to be accomplished.

Magellanica also offers a wider range of diversity in scientists than many other plays. Of the four plays analyzed here, *Magellanica* is the only one to portray those working in a scientific field as anything other than white, cis-gender, straight males. While the other plays do present the scientists as complex, multi-dimensional characters, they offer a narrow portrayal of the changing demographics in science. Although *Magellanica* is set in the 1980s, E.M. Lewis includes among the scientists two female characters, including one Chinese-American woman, and a homosexual male. The expedition leaders also add to this diversity; Adam is African American and Freddie is Latino, although his nationality is never revealed. As expedition leaders, they help to further scientific research. By ensuring that there are diverse portrayals of scientists on stage, theatre more accurately reflects the world of science today and offers a range of viewpoints. This diversity of viewpoints is critical when considering climate change since climate change functions on a global scale both in its causes and its effects.

Questions of representation must be considered when putting scientists on stage, both as fictional characters and as actual working scientists. Bearing in mind the

heightened levels of mistrust of science, it is now more important than ever for playwrights and artists to take into consideration how audiences might view the scientific process and scientists as characters. Diversifying representations of scientists and science on stage may help the fight against climate change by bringing together a wider variety of people with different backgrounds to creatively address the problem. Each of the plays discussed here demonstrates elements of the scientific process. Audiences have a chance to witness the challenges scientists meet as they go through the steps in conducting research as well as see scientists as both experts and as multi-dimensional people, all of which is a step toward improved science literacy and trust in the scientific process.

CHAPTER IV

CLIMATE LITERACY: MEANINGFUL COMMUNICATION

The third tenet of climate change literacy, that a climate-literate person "communicates about climate and climate change in a meaningful way," takes climate change literacy from merely an intellectual and scientific understanding of climate science to synthesis and integration with society and culture (Climate Change Literacy 4). In order to curb climate change, a move from scientific concept to broad social change will require a widespread network of those who understand climate change and its consequences, and are willing and able to take action to combat it. NOAA's document states, "Society needs citizens who understand the climate system and know how to apply that knowledge in their careers and in their engagement as active members of their communities" (Climate Change Literacy 4). This calls for citizens to have the ability to understand how their actions affect climate and how climate change will impact their lives and the lives of humans and non-human species around the planet. Meaningful climate change communication requires an examination of what values individuals and societies hold, and what actions can be taken to support those shared values when deciding how to engage with climate change.

While providing accurate and legible scientific information on climate change is essential for plays hoping to contribute to climate change literacy, meaningful communication about climate change is where theatre and the arts can have the greatest impact by giving audiences new stories about climate change and examples of new ways to communicate about it. Most climate change plays rely on multiple methods of communication and find creative ways to communicate both the science and impacts of

climate change. Offering a variety of communication methods can engage audiences on different levels and increase the chances that all audience members will be impacted by the intended message. Theatre's role as a storytelling medium gives audiences an experience of a live, embodied, climate change narrative and a model for effective climate communication.

COMMUNICATING MEANING THROUGH PERFORMANCE

A variety of strategies can be employed to move individuals from a basic understanding of climate science to connecting climate change to their own lives, and finally to inspiring citizens to take action, both individually and collectively. Susanna Priest notes that "interpersonal communication or a combination of interpersonal and mediated communication can be much more powerful than mediated communication alone" and that this is especially true for climate change communication (165). Live performance bridges the gap between mediated and interpersonal communication. As a live, embodied art form, theatre provides a more intimate and immediate experience than mediated forms of communication, and while much media can be consumed on an individual basis, live performance is inherently a shared community experience. This shared experience also opens up avenues for dialogue among patrons pre-show, post-show, and at intermission. Conversations can be inspired by the performance's content, by program notes or lobby displays, or by formal, structured opportunities for engagement with post-show talkbacks or panels. While theatre may not have the ability to reach as many individuals as many mediated forms of communication, it offers opportunities for deeper engagement and dialogue among its audience members.

One of theatre's strongest communication strategies is through storytelling. Story lies at the heart of theatrical performance and is one of the most effective ways to communicate information. In his book, *On the Origin of Stories: Evolution, Cognition, and Fiction*, author Brian Boyd argues that art and fiction are human biological adaptations, elements that have aided in the survival and evolution of humans as a species (Boyd 11). Derived from play, intelligence, and cooperation, storytelling has proved to be an essential way for humans to form culture and survive. Because storytelling is so deeply ingrained in how humans communicate and learn, it is a powerful tool with which to communicate information and engage the public. Narrative is what gives meaning to facts and information and turns them into a cohesive whole, and there is a growing recognition of the importance of storytelling when communicating with the public about climate change and other scientific subject matter. In literature, climate fiction, or cli-fi, has been a burgeoning field, with authors exploring both speculative and non-speculative fiction inspired by climate change and the challenges of living in the Anthropocene.

Storytelling has also become an essential element in grassroots organizing. Marshall Ganz's development of the "story of self" has been used widely, from President Obama's campaigns for office, to small grassroots organizations (Abramsky). By offering a personal story of how and why they came to be engaged with climate change, activists can engage their audiences on an emotional level. In their book, *Re:Imagining Change: How to use story-based strategy to win campaigns, build movements, and change the world*, Patrick Reinsborough and Doyle Canning champion the many ways that story play a role in grassroots campaigns. From pervasive social myths to personal stories, the way a story is framed can shift audience perceptions. (Reinsborough and

Canning 64). Climate change activists have found that many types of stories can generate meaningful communication, from future-oriented stories of wanting a better world for the next generations, to empathy-driven stories of those impacted by climate change's effects, to inspiring stories of those who have taken action and made a difference.

Narrative strategies have been developing in the field of science communication as well. Marine biologist Randy Olson calls for improved science communication through teaching scientists to have "narrative intuition" (Olson 13). He argues that better storytelling skills will enable scientists to be more effective teachers and be able to explain their research to the public in an engaging way. Science communication programs like The Alan Alda Center for Communicating Science at Stony Brook University have put this into practice. The Alda Center offers workshops and classes that train scientists to "communicate complex topics in clear, vivid, and engaging ways; leading to improved understanding by the public, media, patients, elected officials, and others outside of their own discipline" (The Alda Center). They even draw on improvisational theatre exercises to aid scientists in speaking easily and in an engaging manner (Workshops). Narrative helps humans to make sense of information, and stories make connections among disparate elements more apparent.

Storytelling in theatre also has an incredible ability to provoke empathy in audiences as they identify with the journeys of various characters. While climate fiction draws as heavily on narrative as theatre does, it is in live, embodied performance that empathy comes to the forefront. A strong sense of empathy will be essential if humans are to curb climate change and create a sustainable environment for both human and non-

human life. The reciprocal exchange between audience and actor in live performance generates empathy and builds an energy that flows between the stage and audience. Actors can respond to an audience's energy and alter the momentum of a performance, creating live experience that cannot be replicated. Empathy allows audience members to identify with characters on stage and feel the emotions the characters are experiencing. In climate change plays, this empathy comes to the forefront in characters experiencing the effects of climate change. Climate change's scale and inability to be directly experienced make it more of an intellectual pursuit than an emotional one. Theatrical performance creates an experience of empathy when engaging with climate change as subject matter, and audience members may find that through a narrative journey, they can interact with climate change as a force that can affect them, rather than simply processing the idea of climate change cerebrally. By utilizing various communication techniques, artists may find new avenues to engage audiences in thinking about and experiencing climate change.

In *The Contingency Plan*, *Sila*, *2071*, and *Magellanica*, storytelling generates meaning around issues of climate change. Each playwright approaches their stories differently, but all draw on human relationships and empathy to engage audiences. Climate change features in both large, overarching stories, as well as intimate, personal tales of climate change impacts, and these scales of stories allow audiences to engage on various levels. While meaning can certainly be generated by reading a play, it is in the process of staging a play and sharing it with an audience that these climate change stories come to life and have greater power to resonate with audiences.

CLIMATE IMPACTS IN *THE CONTINGENCY PLAN*

While *The Contingency Plan* features debates over climate science, the heart of the play lies in demonstrating impacts of climate change on the public. The characters discuss the potential threat to different areas of England from sea level rise which is predicted to bring unprecedented flooding, and when an enormous storm does come at the end of *Resilience*, the characters witness the devastating impact of climate change on their country and its citizens.

In *On the Beach*, Will and Sarika visit Will's parents' home on the coast in Norfolk. Will informs his parents of his plan to work with the government, and he and Robin get into an argument over it. Robin eschews the notion that the people who work in government are experts. He says, "I know every inch of this hectare of land, I know the flora and fauna, the microflora and microfauna, every moss and every grub and every particle of soil I've studied through every season … And am I an expert? I can't even say for sure what'll happen tonight" (Waters 45-46). Robin has been disillusioned by his experience interacting with the government, and he has turned to a different type of science, gaining intimate knowledge of the land he has lived on for years. By tracking the plants and animals and weather, he has seen changes and trends form and predicts that flooding will soon reclaim the land he is on. Rather than trying to build resilience however, he is resigned to the flooding and seems to view it as the inevitable consequence of human activity. His ties to his land are so strong that he is unwilling to leave and chooses to stay in his house as the storm approaches.

His refusal to evacuate raises questions of how different citizens will face climate change's impacts. Already, there are climate change refugees forced from their homes

due to flooding and sea level rise, and scientists predict those numbers will grow sharply, with potential numbers of climate refugees in the millions in upcoming decades (Wennersten and Robbins 11). At the end of the plays, when Will believes his father may have died in the flooding, audiences witness the effect climate change's impacts will have on families and communities as citizens begin to face displacement, hardship, and even death. Seeing this situation play out in front of them may make the situation real in a way that statistics cannot.

Chris, the Minister for Climate Change, experiences this impact as well at the end of *Resilience*. Throughout *Resilience*, Chris battles with making decisions in the best interest of the citizens of England. He has to decide how drastic of actions to take in cutting carbon emissions and improving climate resilience, and he bases his decisions on scientific data that proves contentious between the two climate scientists in the play. Will convinces him that a large storm will come soon and cause severe flooding based on the ice melt he has witnessed in Antarctica. When the storm Will anticipates does not arrive as predicted, Chris feels misled and gets angry. Tensions rise to a breaking point as the politician feels misled by the scientist. Chris has just finished calling Will "Nostradamus" for making predictions that do not come true and telling him to "go back to your penguins," when moments later the calls start coming in that coastal communities are being hit by rain and flooding (Waters 168). The governmental team is inundated by calls from towns in crisis and they realize the enormity of the situation when suddenly the power goes out and the characters are left in the dark and trapped in a locked room with an alarm going off. This plunges the audience into darkness as well, bringing them into a shared experience with the characters as they try to figure out what to do in the

emergency situation. The noise of the alarm sounding increases the tension in the room as the characters try to figure out how to unlock the door. It isn't until Colin appears after unlocking the door from the outside and bringing a small light from his bicycle that things begin to calm down. Once the lights are restored, the characters start returning to their jobs and the political conversations resume. This anxiety-producing blackout and sound of an alarm ringing includes the audience in the experience of dealing with a crisis caused by climate change. A shared experience such as this can promote empathy and begin to prepare audiences for future climate change effects.

In addition to impacts on humans, *The Contingency Plan* weaves a thematic ecological element throughout the plays by referencing birds repeatedly. Not only are certain characters concerned for themselves and their human communities, but they recognize the beauty and value that the non-human community holds as well, and show concern for the danger climate change poses to non-human species. In *On the Beach*, Robin tracks the comings and goings of birds on his land through a telescope. The play opens with him calling Jenny to look at a little egret through his telescope and noting how unusual it is to see one in that area. He says, "Little egret. They sense the warming. We know that," and he predicts a storm, saying "That bird knows it. Blown several latitudes north looking for landfall. When it leaves again, it'll be time" (Waters 11). Robin sees the birds as barometers of changes in the climate and weather, and his intimate knowledge of and love for the birds means that by watching their behavior, he can predict when certain weather events will occur. As the big storm approaches, Robin and Jenny are eating dinner and comment on all the different species of birds that are suddenly flying away as the sound of wings plays loudly:

JENNY: Must be five-hundred-odd birds!

ROBIN: And there, the oystercatchers too –

JENNY: Off, off –

ROBIN: Off again, off.

Weeks early.

JENNY: Swallows gone, martins gone.

ROBIN: Even the avocets've –

Pause. The sound fades away.

ROBIN is tearful; he returns to his meal (Waters 75).

Robin's tears at seeing all the birds depart demonstrates his deep connection to the avian fauna he is named for, and his recognition of the environmental conditions posing dangers to them. He is moved by the changes he has witnessed in their habitat due to climate change, and although he has withdrawn from much of society, he cares a great deal about the effects of climate change on the local flora and fauna.

Although Chris presents a more urbanized figure as a politician in London, he too expresses affection and concern for wildlife, especially the avocet. In *Resilience*, he explains to Sarika, "My love for this country comes out in the strangest ways, you know, such as my affection for the avocet - … I consider the avocet the quintessential English bird" (Waters 113). Unlike Robin's connection to the birds, Chris' affection has no grounding in science. Instead, he sees the birds as an integral part of life in England. He says, "I think 'avocet' and immediately I see, what, a levee over a salt marsh, a network of creeks, the distant North Sea as dark as flint, a walk against a wind on a darkening day, entering a smoke-riddled pub and drinking a pint of Norfolk ale" (Waters 113). Chris has

a sentimentally ecological perspective, seeing the birds an intrinsic component of a pastiche making up English life. He values this way of life to the extent that he has taken a large pay cut in order to work to defend that way of life from climate change. Chris's ability to explain his personal reasons for why it is important to fight against climate change provides a model for audiences. It demonstrates that conversations about climate change need not be centered on climate science, but that the meaning and reasoning for why it is vital for humans to work to curb climate change is based in societal and individual values.

The Contingency Plan takes the global issue of climate change and shows the local impacts it will have. While its content focuses on the conflict between science and policy, it raises questions vital to climate change conversations of how best to protect the things a society most values. As the characters are changed by their interactions with science and politics and realize the immediate threat that climate change is posing, audiences are given an example of effective communication about climate change.

As *Sila* explores as well through the loss of traditional ecological knowledge, ecological justice, defined as "the state of balance between human communities and healthy ecosystems based on thriving, mutually beneficial relationships and participatory self-governance," will be required to solve climate change and prevent future environmental disasters for both human and nonhuman species (Movement Generation 5). Implementing new technology and cutting carbon emissions will not be enough to solve climate change; the underlying values of today's extractive culture that caused climate change must be reevaluated if future environmental disasters are to be avoided. Ecological justice calls for a fundamental shift in thinking and actions as it pulls together

many social and environmental issues and considers the many entangled relationships that support an ecosystem.

SILA'S VALUE SYSTEMS

Like *The Contingency Plan*, *Sila* focuses on the effects of climate change and its impacts on a specific location: in this case, Baffin Island in the Arctic. Bilodeau intentionally stressed the ecological connections that climate change affects when she wrote *Sila*. "I can write a play about environmentalists and I could write one about 'bad oil' but it's not helping," Bilodeau says. "I think what's helping is understanding how all of the elements are coming together, and as soon as you move one you move everybody else" (Lindsey). The complexities of this ecology come to the forefront in Sila as climate change threatens to unravel a community.

The melting ice in the Arctic endangers each character in different ways. As these characters battle to preserve life, they ultimately each lose to the effects of climate change. Loss and grief feature heavily in *Sila* and bring to the forefront some of the most fundamental human values of caring for family and friends. This grief serves several purposes. It has the ability to provoke deep empathy in audiences, allowing them to feel a connection with the characters in the play (May *Climate*). Grief also prepares audiences for future realities of living with the impacts of climate change and by doing so, perhaps provides more impetus to take action against climate change. Biologist Carla Wise notes, "Feeling grief signifies that you get it in your gut – that climate change is personal because the things *you* love are in grave danger" (83). Grief comes from a loss of something that holds value. By experiencing grief caused by climate change, people

can realize how climate change will affect the things they value and have an emotional connection to.

In *Sila*, this grief is often caused by the loss of someone for whom the character was responsible for and felt a connection to. Veronica and Mama, the mother polar bear, both lose their children. In both human society and that of many mammals, the loss of a child often provokes profound grief. Bilodeau chooses to end Act 1 of *Sila* with both mothers losing their children. Veronica is in the middle of an argument with her mother and is expressing her need for her mother to help raise Samuel when the phone rings. She answers and learns that her son, Samuel, has committed suicide. The audience only hears Veronica's side of the phone conversation, and while it is not expressly stated that Samuel has died, the audience knows something devastating has happened:

> VERONICA: Hello? … Yes, this is Samuel's mother … Why? Where is he? … Where is he? …
>
> *She freezes. The blood drains from her face. She looks at LEANNA.*
>
> LEANNA: What? What happened?
>
> *LEANNA grabs the phone.*
>
> Hello?
>
> *VERONICA remains glued in her spot, expressionless* (Bilodeau *Sila* 59).

The lack of specific information and Veronica's reaction of shock create trepidation and allow the audience's imaginations to work to fill in the details and envision how Samuel may have died, and what Veronica's subsequent response will be. It also places the audience in a more emotionally heightened state for the next scene, where the mother polar bear also loses her child.

In the final scene of Act 1, the daughter polar bear drowns due to the melting sea ice that has caused the ice floe she and Mama were sleeping on to float far out into the ocean. She is not strong enough yet to swim the distance and although her mother tries to help her, the ocean overcomes her. This drowning is enacted on stage as the sea becomes an active force and pulls the daughter polar bear underwater. Mama fights back, but ultimately loses the battle against the sea, which drags her daughter down. Bilodeau ends the first act with an emotional display of loss as Mama searches for her daughter:

> *MAMA climbs onto firm ground and runs up and down the shore, peering into the water.*
>
> MAMA: Paniapik! [My daughter!] … Paniapik! …
>
> *The DAUGHTER is nowhere to be found.*
>
> *MAMA lets out a series of long desperate wails.*
>
> MAMA: (*softly*) Paniapik … (Bilodeau, *Sila* 61).

Mama's grief is palpable and immediate, felt through her wails and action of running back and forth. Although Mama's character is a non-human species and portrayed by a puppet, these elements may actually serve to provoke greater empathy in audiences.

In many regards, Mama serves as a symbol in *Sila*. She represents motherhood and innocence; she bears no responsibility for climate change, yet her family has been deeply affected by it. As part of the group of charismatic megafauna, polar bears have become worldwide symbols of climate change, with pictures of emaciated polar bears used in hopes of stirring an emotional response in the public, even if that polar bear's condition was not caused by climate change. The director of *Sila'*s world premiere, Megan Sandberg-Zakian, says, "the bears were a portal through which we humans are

able to access the grief of our changing climate in surprising, profound ways" (ii). Bilodeau anthropomorphizes Mama's character, giving her language and mythology, and in doing so, draws on the human capacity for empathy and extends it to non-human species. Beyond the anthropomorphizing that encourages audiences to empathize, Mama also represents what Una Chaudhuri terms "'zoögeopathology': the infliction by humans, on the other animals, of the vicissitudes of displacement" ("Silence" 47). She is a reminder of the deleterious effect anthropogenic global warming has on non-human species as their habitat and food sources are altered, and compounds an audience's experience of grief by going beyond empathy and touching on feelings of responsibility.

In the University of Oregon's production of *Sila* in 2015, director Theresa May carefully considered how Mama would be represented on stage. Avoiding the easy choice of evoking empathy through making the bears adorable and cuddly, May says:

> The polar bears were rehearsed not as objects (puppets), nor even as individual characters, but as possibilities of becoming. "Becoming polar bear" but never "acting" bear, sharing breath and continuous movement, an ensemble shaped and re-shaped, feeling into the question of kinship. Inspired by Inuit depictions of animals and humans as interwoven images of multiple forms, our Mama Bear was multiple, mutating, always shape-shifting: an intermittent apparition ("Radical Empathy").

Including a nonhuman animal as a character brings an inherently anthropocentric lens as humans must make decisions about how the animal will be represented, but May's choice to ask the actors to explore the many complex relationships and forms of the bears allowed for nuanced embodiment. In *Sila*, Mama can present a range of meanings for an

audience. She is a mother, a nonhuman animal, a danger to humans, a key part of an ecosystem, a being fighting for survival, and a symbol of anthropogenic harm to the environment. Productions of Sila must navigate these many meanings and bring critical thought to how the nonhuman beings will be presented to an audience. The characters of Mama and Daughter have the power to create an empathetic response in an audience and endow them with feelings of responsibility as they witness the effects of human actions on the polar bears.

The notion of responsibility plays out differently in Raphaël's experience of grief. He is a new Coast Guard officer and when a phone call comes in from a sinking research vessel, the *Polaria*, he does his best to handle the situation. He must function remotely, calling in helicopters and boats as aid. He stays on the phone with the captain of the boat and talks him through the situation, building a rapport with him over the course of the incident. When Raphaël's pregnant girlfriend calls to tell him she's in labor, he wants to go and be with her, but Thomas, the senior Coast Guard officer reminds him of his duty, saying, "YOU took this call. YOU are the *Polaria*'s lifeline. And when you're someone's lifeline, you don't get to quit" (Bilodeau, *Sila* 81). Tension mounts as several rescue attempts fail. When a helicopter finally makes it to the boat, two researchers are rescued, but the captain can't make it up the ladder and perishes. Raphaël reacts violently, swearing and punching walls. When he calms down, he says, "We were gonna go hiking together" (Bilodeau, *Sila* 92). Although Raphaël assumes responsibility for the people on the boat and attempts to help them, he cannot overcome the weather and ice that threaten the boat and the lives of those aboard. In both time and size, climate change functions on a scale far beyond the capability of individual humans to affect it, and

humans will have to face an increase in the number of natural disasters, no longer entirely "natural" due to anthropogenic climate change. Raphaël's explosion of frustration and anger when up against such a scale can be felt by the audience and understood as a feeling of helplessness when faced with the impacts of climate change.

While grief can have a paralyzing effect, it can also inspire action and unite a community. As May contends, "As we map alternative ways of being and relating, theatre can move us from the terrifying facts through the necessary transformations of self—a newly imagined human expressed in the context of a living, breathing planet" ("Radical Empathy"). The strong emotions felt by *Sila*'s characters may traverse the distance from actor to audience and provide the audience with an empathic connection to climate change issues that goes beyond an intellectual understanding of the science and effects of climate change.

In *Sila*, Bilodeau brings together characters from differing cultures and makes use of their languages to highlight conflict among the characters as well as ways that language can form connections. English, Canadian French, and Inuktitut are spoken. Meant to be performed for English-speaking audiences, Bilodeau suggests that translations of certain lines are projected onto the set. Language becomes a point of contention as Veronica expresses frustration over English's dominance. When Veronica and Jean first meet in *Sila*, Veronica calls Jean out for having worked in the Arctic for years without ever learning any words in Inuktitut, saying, "In fifteen years, you must have learned some Inuktitut," and when Jean skirts around the accusation by claiming he hasn't had time, Veronica replies, "Typical *qallunaaq* [white man]" (Bilodeau 39). She mentions a few words that Jean recognizes, including *qajaq* [kayak] and *iglu* [igloo], and

comments, “Colonialism has a sneaky way of leaving its traces. *Qallunaat* got the land but Inuit managed to infiltrate the language” (Bilodeau 40). Jean’s apathy toward learning her language drives a wedge between them at their first meeting and she declines his offer to teach her class, saying, “If you want to work in Nunavut, it’s not enough to talk AT us anymore. You have to talk WITH us. That’s just *pitsiaqattautiniq* [respect]” and she instructs Jean to find out what “pitsiaqattautiniq” means (Bilodeau 41). When Jean connects with Veronica later in the play he tells her that he learned that “pitsiaqattautiniq” means respect. He has finally made an effort to learn something about her culture and tries to show her respect and caring. This respect for another’s language is a symbol for the respect required among cultures if the global community is going to cooperate to curb climate change.

By including characters from different cultures, Bilodeau also opens up opportunities for intercultural collaboration and learning among the artists producing the show. When describing the production of *Sila* she directed at the University of Oregon, May notes that:

> Yupik students, faculty, and staff became involved as cultural consultants and cast members, making rehearsals a space of connection and exchange around the lived experience of climate change. Rupturing business as usual, rehearsals became an opening through which students forged connections beyond themselves (“Radical Empathy”).

The lived experience of climate change was explored through the interactions of cultures as well as through nonhuman characters. May’s focus on “becoming” rather than representation emphasizes deep ecological connections among populations. With climate

change threatening human and nonhuman populations around the world, openings for cross-cultural and cross-species communication become vital.

2071: A SCIENTIST'S STORY

In *2071*, Chris Rapley and Duncan Macmillan use narrative as a through-line interwoven with data about climate change to enable audiences to connect with the science and with the performer. Employing a linear narrative, Rapley and Macmillan include a personal story about how Rapley became a climate scientist and about his concerns for his granddaughter, who will be his age in 2071. The personal story provides a framework that supports the central scientific content. Macmillan says his role as co-writer was "'entirely about the structuring: our dramaturgical skills can communicate the science to a non-scientific audience.' Scientific papers start with a conclusion, then provide support. 'Dramatically, that's completely inert'" (Trueman 14). Recognizing a storytelling need, Macmillan helped to take the science-based information and shape it into a narrative to guide audiences along a specific trajectory.

With the beginning and end of Rapley's personal story bookending the play, the scientific content is also carefully structured. Rapley gives a basic overview of the systems that make up the study of climate and describes how the systems interact and are measured by scientists. He then tells a linear narrative about changes in climate over the Earth's history, ending with climate changes witnessed today. As he subsequently explains those changes, he weaves together empirical data with the causes of the changes, linking human activity to climate change. He describes the most recent data showing the required carbon emission reductions necessary to prevent a two degree increase in

temperature and presents somewhat dire statistics showing how difficult it will be to meet those benchmarks, but then goes on to outline success stories around the globe in reducing carbon emissions. This gives the audience hope, as he explains he is convinced that "on a finite planet human ingenuity is unbounded" (Macmillan and Rapley 39). Rapley serves as guide and expert, leading the audience through basic climate science and tying that science to human history and economics, rendering the science more relatable and of personal significance.

Early in the play, Rapley relates the story of how he first got involved in climate science. He explains his fascination with science from a young age, outlining major scientific discoveries and accomplishments that occurred early in his lifetime. When Rapley saw how NASA created satellites to take pictures of the Earth and that they could be used to explore and map Antarctica, he changed his career trajectory to work with those satellites. Despite this being a personal story, Rapley does not describe any emotion he felt throughout the different events of the story. The closest he comes is when he describes the satellite's capabilities and says, "I knew I had to be part of this" (Macmillan and Rapley 17). His story is tied to the scientific discoveries and advancements that were made, but not his reaction to them. Even within a narrative structure, Rapley sticks to his scientific training of relating facts rather than impressions, and while this reinforces his authority as a scientist, it perhaps prevents him from connecting with the audience on an emotional level, potentially distancing them. When he returns to this narrative at the end of the play, he uses it to look to the future. He brings up his granddaughter, and says, "She will reach the age I am now in 2071. I try to imagine 2071, and then I find myself thinking what 4071 will look like. Or 10071"

(Macmillan and Rapley 40). By looking to the future, Rapley again connects with the audience, sharing his uncertainty of what the world will be like at that time and how those he cares about will fare.

By raising questions about the future, Rapley reminds the audience that they are members of a community and hold responsibility for their community's wellbeing and future sustainability. Rapley first suggests this idea of community when he says of climate change, "It is an extremely emotive issue. And we are all susceptible to bias and irrationality when confronting it" (Macmillan and Rapley 14). He addresses the potentially divisive emotions of the individuals within the group and unifies the audience by acknowledging that how each person feels about climate change may be a shared experience. Later in the play, he asks the audience to take a collective action when he instructs them to breathe in together:

> Take a deep breath. We're the first human beings to breathe air with that level of CO2. … By being here tonight - by travelling to this theatre, by using these lights, the heating, the amplification of my voice - we have contributed to the amount of CO2 in the Atmosphere. There will be carbon atoms that were generated by this event that will still be in the air in 2071, in the air that my granddaughter will breathe. That's our legacy. (Macmillan and Rapley 40).

This small moment of interaction with the audience is an embodied acknowledgement of both the causes and impacts of anthropogenic climate change, and a reminder that the causes of and solutions to climate change will ultimately rely on the collective actions of community members.

Although *2071* focuses heavily on communicating climate science, it ends by addressing the societal aspect of climate change. Rapley understands that the choice to curb climate change will rely on human values. As theatre professor emeritus at the University of Pittsburgh, Bruce McConachie, notes, "Whether global warming and the evolution of the earth's ecosystems over the next thousand years allow giant squids, *E. coli* bacteria, pine trees, and human beings to survive is irrelevant to an amoral Mother Nature" (91). The Earth will survive even if climate change goes unabated, and although many species may go extinct, ultimately, life on Earth will continue and adapt to the new climate conditions. Questions then, of why combatting climate change is important, come down to human value systems. As McConachie states, "we should recognize that we are promoting ecological reforms to ensure the survival and flourishing of our own species" (92). This is why effective climate change communication must focus on human impacts of climate change and address aspects that humans value most.

Rapley addresses the limitations of science, noting, "Science can inform, but it cannot arbitrate, it cannot decide. … It can't answer moral questions, value questions" (Macmillan and Rapley 41). He goes on to ask the audience rhetorical questions about the values they hold: if they care about the poor, future generations, and the environment. He gives the audience the scientific tools to understand how and why climate change is happening, and then asks them to apply meaning themselves. The play ends with Rapley saying, "The whole point about climate change is that, despite having been revealed by science, it is not really an issue about science, it is an issue about what sort of world we want to live in. What kind of future do we want to create?" (Macmillan and Rapley 41). Rapley leaves the audience with that question, prompting them to consider their values

and giving them a starting point for conversations about climate change. By weaving together scientific facts and their human impacts, Rapley keeps his audience engaged through demonstrating how climate change directly connects to their lives and giving them an example of effective climate communication.

MAGELLANICA WIDENS THE LENS

While *Magellanica*'s plot revolves around the discovery of the hole in the ozone layer, E.M. Lewis makes deliberate connections to how society is approaching climate change today, and although the phrases "climate change" and "global warming" are never uttered in the play, the connections are clearly communicated to the audience.

At the end of the play, the characters are packing up to leave the Antarctic research station after eight months together. Freddie pulls out his video camera one last time and asks each person to give a brief closing message. Differences between Lewis's 2015 draft and the final draft that was presented in 2018's world premiere drive home the message to the audience that they have the ability to curb climate change. An addition to the final script is Lars looking into the camera and saying, "Try to be on the side of the saving," a clear message to today's society (Lewis 2018 draft 260). The cast sings a song together that includes the lyrics:

> We're at the tipping point
> and you get to have
> what you're brave enough
> to ask for... To ask for... (2018 draft 261).

The 2015 draft ends with the song closing and lights coming up on Todor's "New and Accurate Map of the World," which now covers the entire theatre. Lewis's final stage directions read "We are part of the picture" (2015 draft 253). While all of this remains in the final draft, Lewis makes a few notable additions. After "We are part of the picture," Lewis inserts, "And the future is a choice we get to make" (2018 draft 261). Rather than the play ending there, Todor returns with a final message addressed directly to the audience. He touches his map, which lights up, encompassing the audience as well as the stage, and he looks at the audience and says, "We are at the tipping point. And you get to have what you're brave enough to ask for. BE BRAVE" (Lewis 2018 draft 261-262). Lewis's choice to close the five and a half hour play with this message in direct address reinforces the parallels between the scientific events in the play and what is now facing today's society. With much of climate change communication offering dire warnings, Lewis chooses to focus on hope by supporting the idea of a global community and offering a forward-looking directive, to be brave and to "be on the side of the saving."

Lewis does not specify what Todor's map looks like, and in the world premiere, the director and design team at Artists Rep chose to play a video for the audience of global temperature changes over the last several decades. As Todor's map of the world is revealed, the image of the Earth turns from blues to reds as the temperature warms, and the audience is given a striking visual representation of the scale of climate change. This choice adds urgency to the play's final messages encouraging the audience to take responsibility in combatting climate change. This production underscores the role that production teams and theatre companies can play when choosing to bring an ecocritical lens to their works. While playwrights are starting to consider climate change in their

works, directors and designers can also think about what their artistic choices communicate to an audience about climate change. By utilizing ecodramaturgy and decentering the human, theatre artists make a bold statement about the need to combat climate change.

Theatre companies have an opportunity to enhance a production's message on climate change through educational and dramaturgical programming, and even through marketing materials. These choices offer additional access points to a play's subject matter on climate change and can help audiences deepen their understanding. When presenting *Magellanica*, Artists Rep created content for a lobby display, program notes, and website information that gave audiences additional scientific and historical information on both the hole in the ozone layer and on climate change (Program for *Magellanica*). By reaching audiences through multiple formats, the theatre was able to enrich audience members' understanding of the play and reinforce the play's connection with climate change.

By drawing on theatre's inherent strength in embodied storytelling and emotional engagement, live performance has the ability to engage audiences with climate change in a unique and powerful way. Plays addressing climate change may provide a model for meaningful climate communication as audiences watch characters find ways to communicate their perspectives on climate change. Artistic choices also model different ways that the impacts of climate change can be expressed, and audiences can engage on emotional and personal levels with the impacts of climate change. The arts have an

opportunity to help the public find personal meaning in climate change and create ways to express that meaning.

CHAPTER V

CLIMATE LITERACY: MAKING DECISIONS ABOUT CLIMATE ACTION

The fourth tenet of climate change literacy, that a climate-literate person "is able to make informed and responsible decisions with regard to actions that may affect climate," moves from examining climate science and the history of climate change to explicitly looking to the future (Climate Change Literacy 4). Each of the previous elements of climate change literacy provides a tool that can assist the public in choosing what actions to take in regards to climate change. By understanding the basics of climate science and being able to assess information on climate, people gain an understanding of how they are impacting the climate. Being able to communicate meaningfully about climate change then adds a deeper level of engagement. That knowledge and meaning work in conjunction to allow a member of the public to consider how their actions may impact climate change and how climate change may impact their actions in the future. This focus on action is where theatre can provide insight and modelling, even more so than many other art forms, drawing on theatre as an inherently active and embodied medium.

CLIMATE ACTION

Climate change action can take a wide variety of forms and is predominantly focused on curbing anthropogenic climate change and building resiliency. These actions can support global, national, or local initiatives, and be done on an individual or community basis. While each action may be small and appear to have little or no measurable effect, if added together, they have the ability to halt or at least slow

anthropogenic climate change. Paul Hawken's book, *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*, synthesizes these and outlines one hundred actions that if taken in conjunction, may be able to halt climate change. These actions range from renewable energy practices to steps to change food production and transportation, to direct air capture of carbon, and many more varied actions (Hawken vii). Many initiatives are already underway to reduce dependency on fossil fuels, the main cause of anthropogenic climate change, but the 2018 IPCC report shows that these changes need to happen at a drastically faster rate if the worst effects of climate change are to be avoided (Masson-Delmotte, Valérie, et al. 14).

Climate action takes place on many scales, and each type of action brings different impacts. Climate actions on the individual level mean making personal lifestyle choices. These can include reducing how often a person drives their personal vehicle, shopping for products made and grown locally, eating less meat, taking fewer flights, and reducing consumption of energy and products. These are all tied to the idea of reducing an individual's carbon footprint. On a broader scale, individuals can vote for candidates who support aggressive action on climate change. They can get engaged in politics and run for office. Individuals can ask organizations they work with or for to adopt greener practices and support a carbon tax. Creating and sharing art and literature focusing on climate change can help to engage a community. Even the simple act of bringing an awareness of climate change into everyday conversations can have powerful impacts by influencing others.

While action to curb the progression of climate change must be taken if humanity wants to avoid the most damaging effects of climate change, climate action must now

also include building resiliency. Climate change effects are already being seen worldwide. In the United States, the frequency and intensity of hurricanes has increased, bringing higher levels of flooding. Droughts are increasing the prevalence of wildfires, and many species are seeing their population numbers drop due to climate change's effects on their habitat and food sources. These effects are projected to get worse. Even if carbon emissions were halted today, the level of carbon already emitted is enough to continue the effects of climate change for some time (Masson-Delmotte, Valérie, et al. 6). Because of this, action is needed not only to halt climate change's progression, but to build resiliency against its effects. This means planning for storms and wildfires, making sure food and water supplies are safe and stable, and finding ways to support threatened species. While climate change is difficult to witness because it functions on a global scale, the effects of climate change can be seen on local and regional levels and may provide a more concrete way for the public to become engaged with climate change in their communities. Resiliency actions at the community level may also make climate change a more visible issue.

As community members, theatres and other arts companies have a responsibility to be leaders in taking action to curb climate change and set an example for their patrons. Many of the same actions that apply to individuals hold true for theatres as well. Choosing to produce plays that address climate change sends an important message to a community. Theatres can become certified as "green theatres," and make efforts to create carbon-neutral productions and reduce the amount of waste generated through the design process. Even smaller actions such as using recyclable and compostable products wherever possible communicates the company's values to their patrons. As responsible

community leaders, arts organizations can provide a model for climate action and encourage patrons to follow their lead.

ENCOURAGING ACTION

Making a decision to take actions that will help prevent the proliferation of climate change requires not just information but confidence and support. Support can come in the form of intellectual and emotional support from a community, as well as physical support in the form of finances and additional resources. The more a community engages with climate change and puts support structures in place for community members, the better chance those members have of taking actions on their own to improve climate change.

While climate change literacy has been on the rise, actions to curb climate change are still far from sufficient to keep global warming under the two degrees needed to avoid catastrophic effects (Masson-Delmotte, Valérie, et al. 14). While numerous theories as to why this is have been proposed, general agreement is that capitalism's hold over the economy has been a prevailing factor and has stymied efforts to curb climate change. As outlined in the book *Merchants of Doubt*, a small group of scientists and advisors connected to business and politics managed to spread doubt about global warming throughout the American public, eventually holding back progress on fighting climate change (Oreskes and Conway). Sociologist Kari Norgaard's work on climate change denial shows how different forms of denial are pervasive and support apathy rather than action. In her book, *Living in Denial: Climate Change, Emotions, and Everyday Life*, Norgaard argues that it is not always a lack of information about climate change, as has

often been suggested, that prevents action on climate change, but a disconnect between realities of climate change and realities of everyday life, what she calls "double reality" (5). Theatre may not be able to solve all of the issues contributing to climate change denial and a lack of action, but it can help to bridge the disconnect between an understanding of climate change and climate action.

Although it may appear that the large corporations of the world, and especially the oil companies, hold most of the power, social movements have repeatedly shown that grassroots movements have the power to affect social change. It isn't enough to simply agree that climate change is a problem; each person needs to take action to make the world a better place. In climate change writer Naomi Klein's view, "only mass social movements can save us now," and those movements will require action on the part of as many people as possible (450). Promoting climate change action in performance provides a first step toward promoting sustained engagement in audiences. Klein notes, "Immersing myself in the international climate justice movement had helped me imagine various futures that were decidedly less bleak than the post-apocalyptic cli-fi pastiche that had become my unconscious default" (420). Klein found that taking action opened up new ways of thinking about climate change and new possibilities for a positive future. Even without emphasizing climate change action in a performance, the performance itself stands as a model of climate action. As Priest asserts, "Speaking out about climate matters. Not only does it keep the issue on the media and therefore the public agenda, but it shapes the climate of public opinion and nurtures the expansion of people's background knowledge" (166). Every gesture to climate change in a theatrical performance has power to shift public opinion.

Theatre is well-positioned to support grassroots movements and to empower audiences to take action to combat climate change. In a chapter entitled "Ethics, Evolution, Ecology, and Performance," Bruce McConachie asserts, "The arts are not secondary reflections of experience; imaginative engagement in the arts provides real experiences that change who we are and can motivate progressive change in the world" (McConachie 98). By modeling how climate action can be taken, theatre provides experiences that can encourage audience members to take climate action in their own lives, and by offering avenues to support climate action, theatre companies can also connect audience members with support systems in the broader community.

One of the biggest challenges in presenting theatre with a goal of promoting social change is that often the audiences who attend are those already engaged in the subject matter, considered "preaching to the converted." While this is the case for most theatre that focuses on climate change, the focus of such plays need not be on converting skeptics but on increasing engagement and knowledge in patrons. By using effective rhetorical strategies, climate change plays can move audiences from awareness to active engagement. Although audience members may accept that anthropogenic climate change is a significant problem, they can always be encouraged to take greater action and to find new ways to engage with climate change.

Through theatre, action can be inspired in several ways. As plays model climate action through characters making the decision to act, audience members are given representations of what climate action can look like and how to navigate the decision-making process. Audiences may also have an empathetic response to witnessing stories of those impacted by climate change and may be inspired to take action. If theatre

companies provide resources for their patrons, they can help them to connect with community programs or understand what actions they can take on their own. The decisions to take action and of what action to take are based in both climate science knowledge and in value systems, and theatre can inspire action through engaging with both areas.

RISK-TAKING IN *THE CONTINGENCY PLAN*

Set in the near future, *The Contingency Plan* provides a realistic model of the path to climate action through the decisions of two characters. In *Resilience*, both Chris and Will make increasingly stronger decisions as the play progresses, even when faced with obstacles and doubts. While their actions cannot halt the progression of climate change, they each play a part in building resiliency and protecting citizens.

As a public servant, Chris is tasked with making decisions in the best interests of England's citizens. Faced with the complexity of climate change, Chris's ability to make the right decision is complicated by his inability to know for certain what climate change's effects will be. Both Will and Jenks present their opposing arguments to him. While both agree that action needs to be taken to halt climate change, they disagree on the timeline and scale needed. Jenks pushes for continuing with the plan they have already put in place, a slow and steady reduction of carbon emissions that promises not to disrupt the economy and daily lives of citizens too much. Will, on the other hand, brings new research and believes that fast and widespread action must be taken both to halt emissions and to build resiliency against storms and flooding. The drastic actions he suggests threaten to create a great deal of upheaval in the country, so Chris must weigh

his options carefully and do his best to analyze the risk involved with his decision. When he finally decides to follow Will's recommendations, he knows he is taking a large risk. If Will turns out to be wrong in his predictions, Chris has then wasted resources and will likely lose his job. When the storm surge doesn't come exactly when Will predicted it, Chris and Tessa discuss going to the Prime Minister and resigning. They have both taken personal risks as well as have risked the country's stability, but when faced with the potential devastation from climate change, they viewed climate change's effects as the bigger risk.

In a similar fashion, Will risks his job and his familial relationships to pursue what he believes is the correct course of action. Having seen the major changes happening in the ice in Antarctica, he leaves his work as a scientist behind to become a policy advisor in government. In *On the Beach*, Robin questions this decision and prompts a fight between him and Will, saying "I made the mistake of thinking the truth was its own ambassador. And if you do this, now, you will make the exact same mistake again" (64). He then states that the people in the government will use Will, including Sarika, and this drives Will to hit him. Despite this altercation, Will remains steadfast in his belief that working with the government is his best way to create change, and he leaves for London. Through the rest of *Resilience*, Will is bothered by this fractured relationship, but stays in London to continue his work. He goes on to risk his credibility as a scientist by predicting widespread flooding from storm surges. Although he has data to back up his claims, he can't know for sure when the flooding will occur, but in an effort to make politicians take notice, he chooses to make a claim anyway and stick by it, potentially risking his position as an advisor. This decision demonstrates to audiences

Will's trust in in his research, and that trust pays off when the flooding comes as he predicted.

The willingness of these characters to trust the latest science and take action, even when it might mean disrupting the stability of society and placing themselves at risk provides a model for audiences and can prompt audiences to think about their own risk assessment in the face of climate change. By watching characters choose to risk their careers in order to protect others from climate change's effects, audiences may be inspired to be more proactive in the actions they take to halt climate change. The play also may help prompt audiences to get more involved in government. Will was able to make a difference by being willing to work with the government and sticking to what he believed was the correct course of action, even when his career was threatened. While the play is clearly a fictional narrative, that narrative still offers a model for how citizens can have an effect on policy.

SCALES OF ACTION IN *SILA*

Like *The Contingency Plan*, *Sila*'s narrative includes characters who make choices to fight climate change. Over the course of the play, different scales of action are explored as the characters find meaning in personal interactions.

From scene one of the play, Leanna is shown as working to traverse multiple scales of climate change. She is giving a talk at a conference, explaining climate change's effects on the land of her home. She uses poetic language to help her audience (both at the conference and the play's audience) visualize what she is speaking of, describing the land as "a place where you can walk onto the ocean and, if you're lucky,

beyond the horizon itself" (Bilodeau *Sila* 12). Her rhetorical strategy of helping the audience to visualize the land and its history then draws attention to her last lines of "But Nunavut, our land, is only as rich as it is cold. And today, most of it is melting" (Bilodeau, *Sila* 12). She engages the audience emotionally through her poetic descriptions, and then reverses the depiction with the threat of loss. Her rhetoric works to bridge the divide between the audience and her home, moving from a broader, global scale to the regional level. This sets the tone for the play, as the scale keeps focusing further to the community and individual level and exemplifies how climate action is needed on all scales to be successful. Leanna has petitioned the government to take action against climate change and protect her community, and when she receives a letter from the commission that rejects her petition, she and Veronica get into an argument about on what scale climate action is most effective. Veronica says, "At least, you managed to bring the issue out into the open. That in itself is a huge accomplishment," but Leanna counters with, "Not if it doesn't translate into concrete steps" (Bilodeau *Sila* 26). Leanna understands that action must follow awareness in order for her community and land to be protected. Veronica goes on to suggest, "Maybe we can address the problem here, in the community. Create education programs. Invite people to find solutions together," but Leanna believes the problem is far too immediate for community programs to have the needed effect (Bilodeau *Sila* 26). Homes and food supplies in the community are being damaged, and without action on a large scale, Leanna fears the community may not recover. Veronica wants her mother to spend more time on actions at the individual and community level, helping to hold her family together, but Leanna decides to move forward with working at a national scale. In a scene following Samuel's

death, Leanna again gives an address, this time to an appeal board at a commission hearing. She starts with a scientific approach, citing rising temperatures and their danger to the Arctic, but then looks at the audience and changes her rhetorical approach. She says, "The real issue is not and will never be climate change … The real issue is that we have lost part of our humanity. We have lost our capacity to care" (Bilodeau *Sila* 64). Rather than trying to move the appeal board to action through factual information, Leanna tries to move them by appealing to their senses of empathy. She has realized that finding personal meaning and empathy may be more effective ways to move people to take action. Her speech provides an emotional bridge for her audience between scales of action and shows that thinking about the individuals affected may help foster action on a national or global scale.

TEMPERED APOCALYPTIC RHETORIC

Both *Sila* and *The Contingency Plan* use a rhetorical strategy frequently seen in climate change communication, that of the apocalyptic narrative. As a trope in many climate change-based plays, films, and novels, visions of an apocalyptic future are used to demonstrate what the world might be like if climate change is not halted. These predict futures where ice caps have melted, storms and fires ravage lands, massive extinctions have taken place, and humanity has struggled through food shortages, water shortages, and widespread violence as people compete for resources. While these futures are all based in scientific predictions of climate change effects, and even in documented effects that have already occurred, they push those predictions to their furthest exaggeration.

While neither play takes this apocalyptic outlook to the extreme that some narratives do, both rely on showing possible effects of climate change as a way to imbue audiences with a sense of urgency. At the end of *The Contingency Plan*, phones start ringing as news of massive flooding around the country from a storm comes in. The characters describe reports they've received of systems going down and flooding just as the lights go out and an alarm sounds, showing that even the secure government building in London is not immune to danger. The play ends with a sound effect of an enormous storm, bringing the audience into the emergency and giving them a brief experience of what the future might hold. The climate change effects demonstrated in the play are a relatively realistic portrayal of a possible future if climate change is not halted, and hint at apocalyptic possibilities where natural disasters are partially human-generated.

In *Sila*, apocalyptic possibilities are shown through the three types of deaths seen in the play. While Samuel's suicide may not be directly caused by climate change, Veronica and Leanna make it clear that warming temperatures and melting ice have negatively affected their community by disrupting traditional ways of life and damaging livelihoods. As Sheila Watt-Cloutier, the Inuit activist on whom Leanna is based, asserts:

> For Inuit, warming is likely to disrupt or even destroy their hunting and food-sharing culture, as reduced sea ice causes populations to decline or become extinct. So you see, climate change is not just an environmental issue with unwelcome consequences. It really is a matter of livelihood, food, individual and cultural survival (27).

Samuel's death is part of a domino-effect; once one aspect of a community is harmed, the effects continue on to other areas. The daughter polar bear's death is directly linked to

climate change as she drowns in the ocean since the ice the polar bears depend on has melted too much. Similarly, the scientists on the boat get trapped in an Arctic storm, where their boat is damaged by icebergs and most of the scientists drown. All of these deaths and their impacts on the rest of the characters show audiences the wide scope of ways climate change can affect life. The deaths are based in realistic and even documented outcomes of climate change, making their apocalyptic tone perhaps even more frightening because they do seem like real possibilities.

A large percentage of climate change-based plays make use of apocalyptic narratives. The inherent drama in such imagined futures makes it a tempting way in which to explore climate change on stage. While apocalyptic narratives make for gripping and conflict-ridden narratives, they may not be the most effective way to inspire audiences to take action. As Laura Johnson notes in her examination of rhetorical strategies used in Al Gore's famous climate change documentary, *An Inconvenient Truth*, climate change is such a contentious area for discourse that a mixture of rhetorical strategies, termed "tempered apocalyptism," may be the most successful tactic to motivate action (32). She claims that "it is in the (ecological) interaction of various environmental rhetorics that a film like (*An Inconvenient*) *Truth* comes to persuade" (31). Apocalyptic narratives bring a sense of urgency to climate change discourse, but run the risk of making audiences feel overwhelmed when simply faced with dire consequences of climate change. *Sila* counters a sense of despair by emphasizing the power of relationships and ecological connections as the characters find ways to move forward with their lives. *The Contingency Plan* demonstrates that although disasters may occur, humans have the ability to collaborate to avoid the greatest impacts. By tempering

apocalyptic scenarios, *Sila* and *The Contingency Plan* furnish audiences with varied access points for climate change discourse, and even open up possibilities for hope, a requirement for positive action to be taken against climate change.

QUESTIONS OF AGENCY IN *2071*

In *2071*, Chris Rapley takes a direct approach to galvanize the audience into action. In keeping with the tone of his performance, Rapley gives the audience concrete examples of action that can be taken to reduce emissions and halt climate change. He then moves beyond simply offering action items to prompting the audience to think about their role in creating the future. This combination of furnishing tools and then asking the audience to think about how to use them gives the audience tangible ways to take action. However, Rapley offers conflicting visions of hope for the future to his audience, undermining his overall message and leaving the audience without a clear pathway forward.

After spending the first part of the talk explaining the science of climate change that it is caused by human activity, Rapley turns to discussing the future. He describes potential effects of climate change and how much emissions will need to be reduced to avoid catastrophic effects. As in *Sila*, different scales of action are explored. Rapley brings the audience's agency into the discussion early, saying, "Decisions are being made on our behalf at various levels of government and we all need to be part of that process" (Macmillan and Rapley 15). He calls on the audience to participate in their government. As his talk goes on, Rapley continues to focus on a wide scale, saying, "To achieve the necessary reduction of emissions will require a major collaborative effort on a global

scale. It will require the Greatest Collective Action in history" (Macmillan and Rapley 35). He moves on to explain the actions governments are taking worldwide to reduce emissions, citing "growing pressure … from an increasingly informed populace" (Macmillan and Rapley 35). This proves that public engagement can indeed create positive change in climate policy. He then moves from the global scale to the individual, offering examples of actions that each person can take in different areas of their lives:

> Many individuals have taken measures to reduce their own climate-related impacts – by making changes in their personal, professional and public lives - installing solar panels, increasing the energy efficiency of their homes, vehicles and appliances, by using public transport and avoiding unnecessary travel, by changing diet and by choosing to forego activities that generate emissions.
>
> They have encouraged changes to be made in their workplaces and written to their MPs.
>
> They have sought to educate themselves about the issue and to talk about it with their friends, families and communities (Macmillan and Rapley 37).

Rapley covers a wide range of areas of action, from daily lifestyle choices, to writing to elected officials, to bringing climate change into community discourse. These are all concrete examples that audience members can put into action in their own lives.

Immediately after offering the audience direct action items, Rapley then undercuts his statement by saying, "But despite all these measures, global carbon emissions continue to rise" (Macmillan and Rapley 37). This effectively renders the steps individuals have taken inconsequential. Rapley returns to a broader scale, stating:

> To achieve the necessary magnitude and rate of reduction in carbon emissions will require all the clean energy options available to us, as well as the invention and mass roll-out of new technologies, which, at this present moment, do not exist. … My hope lies with the Engineers (Macmillan and Rapley 39).

While Rapley's statement is scientifically accurate, the way it is formed makes it sound as though there is little reason for individuals to make changes in their daily lives to reduce emissions. While Rapley spends most of his performance explaining why audience members should be deeply concerned about climate change, he places the responsibility for halting climate change in the hands of engineers and those who will develop new technologies. When he says, "I would like to see governments, investors and the engineering profession itself, create the conditions for a massive effort of innovation and rollout of energy technologies that will make existing fossil fuel redundant" (Macmillan and Rapley 40), he opens space for members of the public to participate by pressuring their governments to invest in new technologies, but he never outright states that conclusion, leaving the audience to wonder what their role should be.

It isn't until the very end of the performance that Rapley brings the audience's agency back into consideration, but he switches to an entirely different rhetorical strategy. Rather than giving the audience concrete action items, he puts forward an emotional appeal, asking, "The whole point about climate change is that, despite having been revealed by science, it is not really an issue about science; it is an issue about what sort of world we want to live in. What kind of future do we want to create?" (Macmillan and Rapley 41). He ends the play there, asking the audience to think about their vision for the future. This is a powerful ending point, and one that might prompt an audience to

start a discussion with others after the performance, but by offering conflicting action items earlier in the performance, Rapley potentially reduces the effectiveness of his message and leaves the audience uncertain as to their best course of action in combatting climate change.

COMMUNITY ACTION IN *MAGELLANICA*

Magellanica's dramatic structure offers multiple instances of showing how community building supports climate action. The run time of five and a half hours allows for more time to be spent developing relationships between characters, as well as for audience members to build relationships. By building community, a support system for climate action is created, and *Magellanica* both demonstrates and generates that system.

As in *The Contingency Plan*, *Magellanica* incorporates characters who are willing to take personal risks in order to address environmental concerns. Unlike in *The Contingency Plan* however, the decision to take action is made through collaboration and community, rather than as seen through one scientist pushing for change. Dr. Morgan Halsted is an American atmospheric scientist, and Dr. Vladamir "Vadik" Chapayev is a Russian atmospheric scientist. They are both in Antarctica to investigate early findings of the hole in the ozone layer, and they clash over what action to take. While the hole in the ozone layer does not directly apply to climate change action, the similarities make it an excellent model for demonstrating to audiences that it is possible for global environmental action to be taken. Caused by chemicals from human industry entering the atmosphere, the hole in the ozone layer parallels climate change in many ways. To shrink the hole, nations had to work together and agree to halt the use of ozone-depleting

chemicals. In *Magellanica*, Morgan and Vadik know that their findings will be unwelcome and may threaten their careers. Vadik especially faces significant consequences. He was sent by his government and explains, "It is explained to me very precisely before I come here what I am finding. … They know that I will not dare to come back with wrong answer, because I have too much back home to lose" (Lewis 128). He goes on to explain that his life and his family might be in danger if he returns to his country with unwelcome findings. Morgan's response is that they have a responsibility to return with the truth, but Vadik reminds her that she might face unwanted consequences as well, noting, "you are going to have to go back and say that you, cowboy country of America, caused this problem. You are origin of this problem. And you cannot fix this problem by yourself" (Lewis 129). Despite the risks they both face, they understand the importance of their discovery and agree to take action. Vadik summarizes their agreement, saying, "Make plan. Bring home Truth. Save world," (Lewis 131), and he and Morgan shake hands, forming a pact. This pact allows them to work together to convince Adam to take them out on the ice and finish their research. They work together and discover the cause of the hole in the ozone layer, but once they start discussing how to present their findings to the world, they run into disagreement again. Vadik is in favor of using cautious language, while Morgan wants to implement strong language in their report. Vadik argues, "I am not going to sign off on something that is screaming doomsday language," and Morgan retorts, "I'm not going to sign off on something that is so wishy-washy it doesn't say anything" (Lewis 243). While they disagree about the approach to use, their pact to share their findings means that despite

another argument, they are able to refocus their efforts and find a solution. In the closing scene, they are united, saying:

> VADIK CHAPAYEV: We have the opportunity, in Montreal, to work together with each other.
>
> MORGAN HALSTED: And to recognize the responsibility we have to each other.
>
> VADIK CHAPAYEV: Not as Soviet citizens, or American citizens, but as world citizens (Lewis 259).

Morgan and Vadik decide that the environmental threat to humanity is more important than their own personal risk and decide to move forward with their report. They find common ground as scientists and as world citizens concerned about their research findings in Antarctica. By forming a relationship and working together, they strengthen their ability to take action and effect change. While a fictional account, *Magellanica*'s plot is based on real reports of the discovery of the hole in the ozone layer, which means the audience can deduce a positive outcome for Morgan and Vadik's actions. This demonstrates to audiences a way that differences can be overcome to find solutions to global environmental issues.

Magellanica's episodic structure supports the community building needed to fight climate change and prevent future environmental damage. Rather than offering today's popular format of a shorter play without an intermission, Artists Rep took on the challenge of performing a five and a half hour play. This extended format allows for deeper immersion in the world of the play and offers audiences greater opportunity to connect with other patrons and engage with the environmental messages in the play.

Magellanica is written in five parts, and Artists Rep chose to stage it with a ten-minute break between each part, and a twenty-five minute dinner break following part three. Rather than having no intermission or one intermission, audience members had four opportunities comprising nearly an hour in total to take a break, think about the play, read information in the program, look at the lobby display, and talk with other patrons. The printed program includes dramaturgical information about Antarctica, scientific research, and the hole in the ozone layer, and makes the connection between the hole in the ozone layer and climate change clear. A section describes the action that was taken to close the hole in the ozone layer and states, "Like most environmental problems, it will take longer to repair than it did to create, but it demonstrates that with global, collective action, we can avert climatic disaster" (Program 12). This dramaturgical research reinforces the action on stage and gives audience members factual information affirming the effectiveness of environmental action. The lobby display included further scientific information as well as artwork by local artists that was inspired by Antarctica. At each break, these materials offered audiences further insight into the play as well as topics for conversation. Over the course of four breaks and returning to sit near the same patrons each time, audiences have more opportunity to talk with those near them and build relationships. Even if conversation is simply prompted by a desire to avoid the awkwardness of not acknowledging someone they are sitting next to for over five hours, that conversation has the potential to build community. At the February 10, 2018 performance, some audience members introduced themselves to patrons seated next to them and asked them how they were enjoying the play. This overture incited continued conversation over the course of a few breaks as they speculated over the next plot

developments in the play together. These conversations open opportunities for community building and further engagement with environmental concerns, especially since audiences who would choose to attend the play may already have some interest in the topic.

Magellanica's running time and multiple intermissions offer a range of ways for audiences to engage with the environmental subject matter. Rather than arriving for a show, watching quietly and leaving immediately afterwards, *Magellanica*'s audiences can take time at each break to read program materials and look at the lobby display, start conversations with other patrons, and even share a meal with them. In Artists Rep's 164-seat theatre, a five and a half hour-long performance becomes an intimate, community experience that offers modes of building relationship. Unlike the binge-watching nature of online streaming television today, where people can spend many hours on end immersed in a show alone, *Magellanica* creates a communal binge-watching experience where an investment in the play, its characters, and the plot is shared with others. Building community through shared experience and shared interest provides a way for individuals to move from thinking about climate change action on a personal scale to working with others to take action on climate change at a community, national, or even global scale.

CLIMATE CHANGE THEATRE ACTION'S ADAPTIVE STRATEGIES

The plays discussed here offer models of climate action and support ways to move audiences from intellectual and emotional concern to action. Because they rely on the standard theatrical format of a playwright writing a play and that play being produced

in a theatre, each play offers one specific perspective on climate change and is likely to be presented to a limited audience at each theatre as part of a regular theatre season. While more climate change plays are being written each year, few have made their way to commercial theatres or even to larger regional theatres, especially in the United States. For theatre to have a larger impact in promoting climate action, perhaps additional approaches are needed going forward. Traditional plays presented in theatres may reach and impact regular theatre-going audiences, but alternative formats have the ability to expand theatre's reach. Playwrights are increasingly experimenting with a variety of dramatic forms, from Lewis's episodic *Magellanica* to evocative collaborations between theatre and dance, and those forms provide new opportunities for climate change communication and engagement. With grassroots activism recognizing the need for narrative strategies, opportunities for collaborative action between theatrical performance and grassroots organizations may provide important ways to engage the public with climate change and encourage them to take action.

In 2015, Chantal Bilodeau, along with several collaborators, founded a project called Climate Change Theatre Action (CCTA), which Bilodeau defines as "a worldwide series of readings and performances of short climate change plays presented to coincide with the United Nations Conference of the Parties (COP) meetings" (Bilodeau xv). Although Bilodeau is committed to writing full length plays about climate change (*Sila* is the first of eight plays she is writing about climate change in the Arctic), she recognizes the need for different formats to help climate change theatre reach broader audiences. She describes the impetus for CCTA's creation, saying:

> Dissatisfied with the low level of engagement from theatre artists at the time, and the lack of opportunities for communities to discuss climate change in non-scientific settings, we set out to do two things: encourage more playwrights to address climate change in their work and promote storytelling as an entry point into a difficult and often emotionally charged conversation (Bilodeau, "Introduction" xv).

This two-pronged approach encourages involvement from both artists and those in scientific fields, opening pathways for finding new ways to engage with the complex subject of climate change, and reaching different audiences.

Rather than formatting the project as a new play contest or as commissioned full-length plays, Bilodeau chose a structure that offers flexibility and engagement from a more diverse population, and with "action" a part of the title, CCTA places focus on activism in a way that other climate change plays fail to do. While other plays may increase knowledge and empathy, CCTA provides a clear pathway to move from an intellectual and emotional space to a place of action.

CCTA reached audiences around the world in its original iteration. First presented in 2015 at the same time as the Paris Climate Agreement was being negotiated, Bilodeau commissioned forty playwrights to write short plays about climate change. In 2015, these plays were presented in various configurations in one hundred events across twenty-six countries, although the majority took place in the United States (Bilodeau, "As the Climate"). Following the success of the 2015 events, CCTA continued in 2017 in conjunction with the COP 23 meeting held in Germany. In 2017, CCTA grew to include fifty playwrights, and one hundred and forty events took place in twenty-three countries,

with every continent except Antarctica represented. The next iteration is scheduled for 2019 alongside the COP 25 meeting. With climate change becoming of greater and greater concern, and with the number playwrights beginning to consider climate change in their works increasing, the 2019 CCTA event is likely to continue to grow in the number of participants, reaching new audiences.

The flexibility of CCTA's structure, which is designed to be accommodating and adaptable, creates as few barriers to participation as possible. Anyone may produce an event; the only restrictions are that it should take place in the weeks surrounding the COP meeting, be registered with the CCTA project, and include at least one of the written plays provided. Those producing an event, termed "collaborators," are encouraged to include an action along with the plays, but it is up to the collaborators to decide what that action will be. Events can and do take place in a wide variety of locations: schools, theatres, churches, parks, backyards, and even one event that took place at the foot of a glacier. Collaborators may select as many of the plays as they would like to produce, and can include performances created by local community members. There are no royalties or fees, so events can be produced as inexpensively as possible and collaborators may offer free admission, or can solicit donations for organizations. Although the plays are free to produce, larger events often require some level of funding, which may create a barrier for those without a reliable source of funding. While some collaborators have put on full productions with set pieces and costumes, others have offered readings, which reduces funding needs. Many performances have been produced by universities and colleges, but other community groups and individuals have participated as well. This adaptability means that CCTA events can be produced by those with little knowledge of

climate change, and with any level of theatrical experience, and so have a chance of reaching a wider audience. Rather than asking audience members to come to a play in a theatre building, the plays can be taken to the community and performed in public spaces where traditional non-theatregoers may be reached.

With the flexibility of CCTA's structure comes the opportunity to involve a wide range of people in each event and foster interdisciplinary collaboration. The arts and science both offer a way to broaden the other's perceptions of climate change and find new communication strategies. At Arizona State University in 2017, theatre students partnered with biodesign researchers for their CCTA event. They chose plays that reflected elements of the researchers' work; one paired research on penguins in Antarctica with Elspeth Tilley's play, *The Penguins*, in which a group of penguins analyze and comment on the scientists studying them. Along with each play, a researcher gave a brief talk on their work (Climate Change Theatre Action). This juxtaposition opens up dialogue and furnishes audiences with two different perspectives on a topic from which to begin their conversation. While many events have taken place at colleges and universities where interdisciplinary collaboration is often encouraged, others have been held at theatres, libraries, and other public spaces. These offer opportunities for local environmental nonprofits to connect with the arts community and vice versa, opening up options for future collaborations. These events also give community members a change to find out more about what both groups are working on.

By creating a space for the science and art communities to come together, Bilodeau's focus on encouraging playwrights to address climate change in their works is supported. Climate science may seem like a barrier to many artists, as it is an immensely

complex field and typically far outside the purview of most art. By offering brief engagement with climate topics through one to five minute plays, artists are given a model for how they might approach climate issues in their own longer works. With few restrictions given in regards to the format of the plays (plays must be one to five minutes long, be able to be performed without a set or props and be able to be performed with script in hand), playwrights have freedom to find the most appropriate dramatic structure to support their idea. Bilodeau says, "if we want to be active participants in shaping our future, we need to move beyond writing plays *about* climate change to writing plays that *are* climate change—plays that embody, in form, content, and process, the essence of the issues we are facing" ("In Search of A New Aesthetic"). Bilodeau notes that by commissioning playwrights and leaving the content and structure open, playwrights were able to play with form without feeling the pressure of failing (Personal Interview). The forms chosen by the playwrights range from monologues and songs to plays with eight or more characters. Some provide a deliberate beginning, middle, and end, while others maintain with a looser structure. Each of these offers a different way to engage with climate topics. While many of the plays are arguably *about* climate change, the pervasive nature of climate as a topic and the varied perspectives takes a step toward Bilodeau's call for plays that *are* climate change.

In addition to interdisciplinary dialogue between the science and art communities, CCTA opens space for dialogue among a broad range of global perspectives. By commissioning playwrights around the world, Bilodeau took active steps to engage the global theatre community in climate change discussions as well as ensure that

perspectives from many countries and cultures were heard, including those where the greatest impacts from climate change will be felt. In the plays, characters include humans dealing with the impacts of climate change, climate scientists, politicians, and nonhuman animals. Plays are presented from the perspective of penguins, eagles, frogs, and other animals, and this allows playwrights to imagine how the nonhuman world might view and experience climate change. Although these perspectives are written from a human lens, the nonhuman world is at least given a voice and shown to have a large stake in climate change. By having each play be five minutes or less, different viewpoints can be juxtaposed against one another, challenging the audience to think about the topic from multiple perspectives. Many plays also make use of humor, an element sorely missing from many approaches to addressing climate change, and the humor used in CCTA plays generally reflects the playwright's cultural background. While the humor employed is often dark or satirical, it provokes laughter, a response audiences aren't likely to usually associate with climate change, again prompting them to think and react in a new way.

The largest barrier to this global perspective is that of language, as so far, CCTA is an English-based project. There have been a few plays written in languages other than English, but they have all been translated into English, a process that requires significant resources. If plays are to be performed in non-English languages, someone will have to go through the process of translating each of them. There are several possible solutions to this problem. Grants could be sourced so that collaborators in various countries can hire translators. There could be plays written as spectacle, without any language needed, or with very little language. And with more

playwrights being commissioned each year from non-English speaking countries, a database of non-English plays could be compiled over time. This is an important step, because if CCTA is to accurately represent climate change as the global concern that it is, then non-English speaking voices will need to be included as well.

CCTA's deliberate focus on action makes it stand out from other performances that address climate change. For the 2017 CCTA events, Bilodeau provided the following prompt to the writers, calling on them to focus on hope and action:

> Assume your audience knows as much as you do. Assume they are as concerned as you are. But they may not know what to do with this information and those concerns. So how can we turn the challenges of climate change into opportunities? What can be done? What tools and strengths do we possess to address the challenges in front of us? We don't need to repeat the same depressing news we hear all the time; let's move the narrative forward (Bilodeau, *Where is the Hope* xvi).

Rather than writing *about* hope, she encouraged the playwrights to write pieces that *are* hope, plays that could demonstrate the perspective needed to take action. This avoids one of the common pitfalls of climate change presentations, where predictions of doom and apocalyptic futures are given, leaving audiences feeling anxious and depressed rather than uplifted and motivated. By focusing plays on hope and action, audiences are given a way to envision hopeful futures and new options for discussing climate change. At Iowa State University, the director of the CCTA event there took advantage of the flexibility of CCTA's structure to emphasize hope by structuring the order of the plays presented, "arranging the pieces to move the audience from awareness to hopeful action and bring

out the focus of people working together" (Climate Change Theatre Action connects). By choosing plays that will most resonate with a community and invite audience participation, and by choosing the order of the plays presented, collaborators have the ability to focus on community building and action.

In addition to the structures of CCTA and the plays offered, the action element is a vital component of CCTA. Bilodeau leaves it up to the collaborators to decide what type of action would be most appropriate for their event and community. Some collaborators offered postcards that audience members could mail to their elected representatives. Others brought in climate scientists or activists to give talks or hold panel discussions. Others focused on local action particular to their community. Including an action item reinforces a feeling of community and lets audience members experience taking action to halt climate change. It allows audience members to feel that they can make a difference and have an impact, rather than feeling overwhelmed by the scope of climate change and its effects. An atmosphere of positive action may encourage audiences to continue to be actively engaged in fighting climate change, or may at least make them more willing to participate should another opportunity present itself.

Response to CCTA events has shown that the variety of approaches to climate change from the plays and playwrights has the ability to inspire discussions and action. Stephanie Lein Walseth, a member of Full Circle Theater Company, who produced a CCTA event, notes that "across the board, artists, participants, and partners were amazed and delighted with the ways that the plays and their simple embodiment provided an excellent springboard for conversation" and that the plays "culled complexity and catalyzed critical thinking while simultaneously evoking affective responses" (Walseth

27). This is perhaps the most important aspect that theatre and the arts can bring to climate change conversations: opening up discussion and thinking, and providing inspiring and provocative stories. Bilodeau summarizes responses to CCTA's projects, saying:

> We heard that CCTA was valued for:
>
> - being participatory and global
> - representing many voices
> - building community
> - generating hope
> - bringing together people from different fields and disciplines
> - providing a different point of entry into the climate change conversation
> - affirming the voices of those whose community doesn't support their choices (Bilodeau, "Introduction" xvii).

Each of these points provides a critical access point for the steps needed to combat and adapt to climate change. The sense of community and empowerment that theatre can generate is a crucial element in the climate change conversation, and by creating an umbrella for worldwide events in any community, CCTA may inspire other artists to consider climate change and the environment in their works.

Although most CCTA events play to small audiences for just one performance, CCTA's structure allows it to reach a wider demographic than those who traditionally attend theatres and engage directly with community environmental organizations and climate scientists. By including global perspectives on climate change, audiences are

offered diverse ways to think about and experience climate change issues. CCTA's inclusion of scientists, global perspectives, community organizations, and new audiences, begins to mirror the complexity and global nature of climate change and takes an important step toward creating plays that are climate change, rather than about climate change.

CHAPTER VI

CONCLUSION

Fighting climate change is ultimately about placing value on an imagined future for humanity. The Earth will survive climate change regardless of what happens to humanity or how many species go extinct. When those fighting for climate change activism talk about "saving the Earth," they are generally talking about saving an Earth that will best support human life and culture. While science can explain why climate change is occurring and predict likely effects, how society responds to that science is a cultural choice based on human values. Choosing to take action to halt the progression of climate change means placing value on biodiversity, on social justice, and on future generations. These values stand to protect human cultures and not place human and nonhuman bodies at increased risk. In order to take action against climate change and in support of those values, societies must improve their climate change literacy. The public must have an understanding of how climate change is caused, how its effects will be felt, and how to take action to stop it, and they must be able to see how halting climate change is in line with what they value. Plays about climate change have the ability to improve every aspect of climate literacy, but where theatre is most effective is in reminding audiences of what they most value, and how climate change threatens those values.

All of the plays examined here offer insight into each tenet of climate change literacy, and all are tied together by underlying questions of what values are challenged by climate change. While some focus more heavily on explaining science and others on the effects of climate change, all raise questions of what human values come into play when choosing how to address climate change. From *2071*'s direct questioning of what

kind of future the audience wants to the explorations of love and loss in *Sila*, human values in the face of climate change form the core of each play. Theatre's live, embodied performativity enables it to bring those values to life and create stories that prompt audiences to consider their own role in climate change.

The number of plays addressing climate change has seen significant growth over the last decade, and that momentum is inspiring innovation. As the human causes of climate change become more widely accepted and climate change enters into many areas of discourse, playwrights begin to see room for theatrical interventions into climate change. The full-length plays discussed here are representative of the most common form of climate change theatre. By drawing on traditional dramatic structures, the topic of climate change has begun to make its way into regional theatre companies and impact audiences. However, the urgent nature of climate change demands that theatrical tools be implemented in any way possible, and some playwrights are beginning to explore alternative formats, from collaborations and devised work, to different staging options. Climate Change Theatre Action is just one example of some of these theatrical experiments.

Additionally, other ways of supporting theatrical representations of climate change have been developing. Organizations have been created in recent years dedicated to addressing environmental issues in the arts. A few of note are Broadway Green Alliance, Julie's Bicycle, Earth Matters On Stage, and Superhero Clubhouse. Each fills a very different role. Broadway Green Alliance works to help theatre productions and companies to use resources more sustainably. Julie's Bicycle is a "charity that supports the creative community to act on climate change and environmental sustainability. [They]

believe that the creative community is uniquely placed to transform the conversation around climate change and translate it into action" ("About Us" Julie's). Earth Matters On Stage (EMOS) is "a consortium of artists, educators, activists, and scholars who believe that theatre and the performing arts must respond to the environmental crisis" (About Earth Matters). EMOS holds regular symposiums and sponsors the "Ecodrama New Play Contest, which calls playwrights and theatre makers to engage in the global and local ecological issues that face societies across cultures" (About Earth Matters). As of 2018, five play have won the contest and were given productions at a symposium, including *Sila* in 2012. Superhero Clubhouse is a "community of artists, scientists, and environmental professionals invested in a long-term experiment to understand how theater can help shift consciousness in the face of global climate change" ("About Us" Superhero). While each organization has a different goal and approach to climate change, all are working to bring discourse on climate change to the arts and inspire action. These organizations were created in response to a lack of attention to climate change in arts communities, and have helped to fill that gap. They are promoting not just the creation of climate change plays, but of an ecological sensibility that can be applied to any area of the theatrical process. The work of organizations like these has helped to support the development of climate change plays and assist in making climate change a larger part of the theatrical conversation.

With the rise of public acceptance that climate change is caused by human activities, and particularly carbon emissions, there is less need for theatre to focus on helping audiences understand climate science. Instead, theatrical performance can start bringing an ecological mindset to all areas of theatre, which serves to normalize

ecological awareness, rather than it being an exceptional topic. Historical plays can be examined through an ecocritical lens. Plays that address the oil industry or capitalism should be assessed on the ways they are contributing to climate change discourse. Theatres can bring sustainable practices to all their productions, and publicize their efforts, putting sustainability messaging in front of patrons. All of these areas are important to consider so that climate change plays are not singular, disconnected events, but instead, foster sustainable practices and ecological sensibilities across the theatrical discipline. Just as a wide variety of approaches to climate change are needed in plays, action on climate change needs to factor in all areas of theatrical production. As anthropogenic climate change continues to grow in acceptance in the public and more people become concerned about the effects of climate change, theatre needs to be at the forefront of cultural responses to those trends.

With the number of climate change plays growing, scholarship on climate change theatre needs to increase as well. While ecocriticism in theatre has been slowly developing for the last couple of decades, there is still a significant lack of scholarly analysis of climate change theatre, although trends in the last few years are now starting to shift toward more engagement with issues of climate change. Academic analysis of climate change in performance can offer critical analysis and note trends. Because climate change action has a specific goal of lowering greenhouse gas emissions, it is useful for artists and scholars to think about how climate change theatre is contributing to that goal. Playwrights and artists can take on activist roles by considering research and studies from other disciplines that examine what climate change communication strategies are most effective in improving climate change literacy and inspiring action,

and further research is needed into how narrative and performance can increase climate change literacy and inspire action as well. The anticipated timeline of climate change makes these matters of great urgency. If carbon emissions are not drastically lowered soon, global warming will progress beyond 1.5°C of warming, threatening human and non-human life in many ways (Masson-Delmotte et al. 9). Careful consideration of how to approach climate change in theatre will assist in its effectiveness as a tool of climate change literacy.

Climate change's complexity calls for complexity in theatrical interventions, and there are many methods for including climate change in theatrical performance. Each of the four plays interrogated here brings a different perspective on responses to climate change. This range of perspectives can enhance climate change literacy in different ways. From engaging directly with climate science, to evoking empathy and inspiring action, theatre is a tool that can be leveraged to make climate change personal and meaningful to all audiences. This diversity of engagement is essential for finding effective interventions. If plays are to engage audiences and inspire climate action, artists and scholars need to critically examine what a play is communicating about climate change and human relationships to the environment. Climate change theatre has the ability to create live, embodied experiences of climate change that engage and inspire audiences, but requires careful analysis if it is to be useful in promoting activism.

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