

THE ROLE OF ART IN THE GLOBAL CLIMATE CHANGE MOVEMENT

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THE ROLE OF ART IN THE GLOBAL CLIMATE CHANGE MOVEMENT

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DEDICATIONS

Dedicated to my daughter, Dottie Bear, who brings fresh perspective to my world every day, to my supportive husband, Brian, who grounds me when my ambitions are a little too grandiose, and for the Earth, that is vital for life and inspiration—worth the daily struggle of advocacy.

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Abstract

The findings presented in this publication suggest that artists and arts administrators have significant roles to play when using the arts to address climate change. Responses from three artists and four scientists during in-depth one-on-one qualitative interviews indicate that the role of art in the global climate change movement is to deepen personal engagement with climate change issues by providing new platforms for deeper reflection and discourse—with or without the intent to catalyze activism. Artists do not need to maintain strict fidelity to climate change data, although there may be an inverse correlation between manipulating climate data and validation of the work to accurately comment on climate change. The contemporary climate change movement requires the integration of artists to respond to the challenges of climate change not merely as buffers between the public and the hard data but to incite a richer and more complex conversation through the cumulative impact of all art that addresses climate change.

Introduction

“Art can convey in a different way than science the threat that climate change poses to our planet. The world’s best scientists have tried to wake-up politicians to the climate crisis, now we’re counting on artists to help.”—Bill McKibben, Founder of 350.org (350.org n.d.)

What is the role of art in the global climate change movement? Climate change is arguably the greatest challenge of the 21st century—a matter that scientists from around the world have been researching, discussing, modeling and preparing to mitigate for decades. The scientific community is in vast agreement of the rapid threats of climate change, yet regional awareness and response to climate change has been varied. Can art play a role in engaging and activating individuals in the contemporary climate change movement? Artists have been responding to environmental changes since the 1960s and have been giving climate change more attention in their art in the past two decades. As an artist, environmentalist and arts administrator, I am seeking answers to the scope, depth and efficacy of art that addresses climate change.

This study explores where and how artists fit into the global climate change movement through the perspectives of artists interpreting climate change and scientists with a vested interest in climate change. I interviewed three artists and four scientists at length. The role of art in the global climate change movement quickly became the center of my research and ignited the secondary burning question, ‘What is your opinion of artists maintaining fidelity in their work to the climate data?’ These two questions are at the epicenter of my research.

The need for this study originates from two sources: a lack of literature on how artists and scientists are working together with a shared common goal to disseminate climate change information to audiences; and, a vested interest in the intersection of art and climate change stemming from my academic backgrounds in both fine art and ecology. The literature

acknowledges a lack of impact studies regarding the capacity of climate change art to bring awareness to climate change issues. Rachel A. Howell's study, *Investigating the Long-Term Impacts of Climate Change Communications on Individuals' Attitudes and Behaviors*, will be discussed at length (2014). Howell developed a longitudinal impact study asking participants to reflect on how a climate change film has or has not contributed to any changes in their personal attitudes or mitigation actions towards climate change. Additional research studies, such as those led by Saffron O'Neill and Sophie Nicholson-Cole in 2009, indicate visual imagery has the potential to act as a catalyst for disseminating climate science data to the public in a personal and engaging way but only if done so strategically. The literature shows the capacity of art is to create a personal connection to climate change—to offer an avenue of *individual* awareness and engagement on a *local* level. While the literature offered art as a creative form of communications, my primary research led me down a deeper trail, through a rabbit hole of possibilities for art to engage in the contemporary climate change movement. In the context of the literature review, my research contributes a deeper conversation on how artists and their art are woven into climate change engagement and action.

My goals in this preliminary research are: to identify the role of art in the global climate change movement, to explore the relationships between and the perspectives of artists and scientists addressing climate change, to explore the relationship between an artist's fidelity to climate data and the art's ability to increase climate change awareness in an individual, and to understand the challenges of quantifying the impact of climate change art. I began my research with a different set of goals and had planned to study artist-scientist collaborations addressing climate change. My focus changed rather quickly after the first interview with Dr. Joe Smith. What I found between artists and scientists was a much more complex set of relationships—not necessarily collaborations—but interactions with deep dialogue and budding relationships with shared goals. Investigating the role of art in the global climate change movement produced more questions than answers by the end of this research; however, I came away with two key insights.

The contemporary climate change movement requires the integration of artists to respond to the challenges of climate change not merely as buffers between the public and the hard data but to incite a richer and more complex conversation through the cumulative impact of all art that addresses climate change. Superficially, the arts can be a tool for disseminating complex climate information to larger publics. Through this research, participants led me down a tunnel of deeper connections and happenings in climate change art, from small works to mass public events. As an artist who has attempted to create effective climate change art in the past, I realize what I thought was a failure to engage audiences, was really just another contribution to the global artist response to climate change. Collectively, large *and* small art-climate change projects contribute to the ongoing revolution that is the global climate change response. I had not failed; I have contributed to the global climate change movement and to the burgeoning contemporary conversation.

Methods and Limitations

My research was designed to investigate the role of art in the global climate change movement through the perspectives of artists and scientists. My methodology involved one-on-one qualitative in-depth interviews with each of seven research participants, offering the conversational partners a chance to be honest about their opinions of the role of art in the global climate change conversation, inclusive of the capacity for art to address the complex issue of climate change, funding and the realities of measuring impact of art and climate change projects. Each participant was offered anonymity in this study, yet all participants agreed to have their name published.

Participants of the study include four scientists and three artists. Dr. Joe Smith is a graduate of Cambridge University, holding a faculty position as Professor of Environment and Society at Open University, London. His expertise is in environmental policy and politics, with a focus on the intersection of media, public awareness and environmental change. Dr. Sallie Marston is the Principal Investigator of the United States counterpart to a two-year international research study, *Art-Science: Collaborations, Bodies, and Environments*. Marston and her team researched five contemporary collaborative art and science programs across the United States, Europe and Australia to explore artist-scientist collaborations and institutional, political, epistemic and technological networks that inform those collaborations. Dr. Tony Broccoli is the Co-Chair of the Rutgers Climate Institute, which seeks to educate and intersect departments and communities within the larger university landscape, expanding the conversation of climate change. Dr. Katie Sokolowski is what I will define as a *hybrid*—both artist and scientist; she is an exhibiting artist as well as a Neuroscience Researcher and Toxicologist. Three artists were included in this study. Annie Cattrell is a Senior Research Fellow in Sculpture at De Montfort University and a Tutor at the Royal College of Art in London. Cattrell participated in the 2011

Cape Farewell Project's Scottish Islands Expedition. Her art reflects a cross-disciplinary approach. She has collaborated with meteorologists, engineers, neuroscientists and psychiatrists to create her art. Laura Petrovich-Cheney holds a Master of Science in Fashion Design from Drexel University and a Master of Fine Arts in Studio Arts from Moore College of Art and Design. She exhibits her sculptures and installations extensively across the eastern United States and has received several awards, fellowships and residencies in the past 10 years. Petrovich-Cheney went on the 2013 Arctic Circle Residency to Svalbard, Norway, where she experienced effects of climate change and the human mark in the Arctic. Peter Handler is a furniture designer, jeweler and sculptor, receiving his Master of Fine Art at the School for American Craftsmen at Rochester Institute of Technology. Handler combines his knowledge of furniture design with climate change issues, producing intricate sculptures that address changing environments and loss of biodiversity. Additionally, Handler has just returned from an exploration of the Fairbanks and Denali, Alaska region, studying permafrost (soil that remains frozen for a very long time—thousands of years) and thermokarst (irregular land surfaces in Arctic regions that produce marshy areas as permafrost melts) (National Oceanic and Atmospheric Administration 2015). The results of my primary research are based upon the seven individuals chosen for this study. While my study gathered insights from people across the United States and United Kingdom, it is important to understand that my conclusions here might have been different had I interviewed a larger pool of artists and scientists from around the globe.

Coding qualitative data from the interviews directed this research study to focus on the most intriguing question for participants: What is the role of art in the global climate change conversation? Results show consistency in some responses yet surprising views in others. While personal experiences contributed to the 5-7 questions asked of each participant, three main research questions were maintained throughout all interviews; an additional two framing questions supplemented the research (Appendix).

The original objective of this research was to explore art and science collaborative organizations in the United States and abroad through a collective case study approach; however, participant limitations from those organizations, along with a lack of ideal organizations to profile (specifically within the United States), directed the research toward qualitative interviews with select scientists and artists invested in climate change. While I planned on interviewing the Cape Farewell Project in the United Kingdom and the Robert Rauschenberg Foundation in New York—two of the largest art and climate change organizations recognized on a global scale—neither organization accepted my request for interviews. Further research indicated the Cape Farewell Project has been extensively profiled, resulting in my assumption that a Master’s thesis-length paper would not contribute much to the literature.

Dr. Marston, in particular, was limited by the timing of my research. Her team’s two-year interdisciplinary research study yielded an immense amount of data that her team is currently coding and publishing. Dr. Marston informed me that investigating art and science collaborations is a burgeoning research area, difficult to take on, yet with a multitude of funding opportunities. She was unable to comment on several points of her research due to pending publications—although, she did offer insights and personal opinions on several projects she encountered that integrate art with climate science specifically.

The results of my research are framed within the context of the seven research participants and might have resulted in a different analysis if more interviews had been performed. Research participants have unique views on both art and climate change, based on their experiences, education, cultures and value systems. While time limited the number of interview participants in this study, I would offer that additional qualitative interviews with a larger pool of both artists and scientists from diverse regions—those invested in climate change and those who are not—could yield valuable new data and avenues of exploration regarding the role of art in the global climate change movement. Thus, this research should be considered as a *start* to a much wider conversation.

Climate Science in Recent History

The term *climate change* can be vague and challenging; I begin by defining the term in the most qualified way possible. The United Nations and the World Meteorological Organization established the International Panel on Climate Change (IPCC) in 1988. Today, it stands as the leading international organization to assess current data and trends collected from scientists across disciplines from all over the world. Thousands of scientists contribute work; government and peer reviews are essential to the process of integrating information reflecting a range of perspectives and disciplines. The work of the IPCC is policy-relevant for governments of the 195 countries involved yet remains policy-neutral (IPCC n.d.). The IPCC defines *climate change* as:

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (1995).

The Oxford Dictionaries give the more commonly used definition of *climate change*:

A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels (2015).

Natural systems certainly contribute to climate change, such as: atmospheric-ocean interactions, volcanic CO₂ emissions, land-surface atmosphere interactions, and the sun. Human-caused climate change factors are the focus of the global climate change movement, and these include: greenhouse gas emissions from the burning of fossil fuels since the Industrial Revolution c.1750, land-use changes including deforestation and agriculture, and the use of aerosols (Solomon, Qin, Manning, Chen, Marquis, Averyt, Tignor and Miller 2007, 2.1). Climate change encompasses more than just global warming, though the two terms have become synonymous. More frequent and violent natural disasters, ice cap, ice sheet and glacial melting, rising sea levels, increased wildfires, longer droughts, fatal heat waves, and ocean acidification are major concerns that stem from climate change (Natural Resources Defense Council 2015). The more complicated an issue,

the harder it is to communicate the message; to compound this assertion, personal value systems and individual circumstances contribute to the degree of belief and level of action regarding climate change.

The Yale Project on Climate Change Communication sought to deepen our understanding of climate science and public climate opinion. National survey data between 2008-2014 were gathered into statistical models to create climate change public opinion maps. In 2014, 63% of Americans agreed global warming was happening, which means 37% did not think that global warming (synonymous with climate change) was a current issue. North Dakota, a landlocked state, ranked last with 24% when asked if climate change would harm them personally, while Hawaii, a state surrounded by water, ranked first with 43% of residents feeling climate change was a personal matter (Howe, Mildenerger, Marlon and Leiserowitz 2014). This data may indicate that an individual's personal feelings on climate change are reflective of their local region's weather patterns and fluctuations. In a 2010 report from the Center for Island Climate Adaptation and Policy, geomorphologist Dr. Chip Fletcher provided evidence that Hawaii's climate was changing in ways that were consistent with global warming: rising air temperatures, rising sea surface temperatures, acidifying oceans, sea level rise, rainfall and stream flow decrease, and an increase in rain intensity. Fletcher stated some of these changes, such as the rate of warming at high elevations, were happening at faster rates than the global averages (2010, 1). Hawaii's residents are able to visualize regional environmental changes more dramatically than landlocked states because Hawaii is an island in the middle of the Pacific Ocean near the equator. Perhaps this increased observation of local environmental changes has contributed to more people in Hawaii reporting that climate change is a personal matter. The Yale Project on Climate Change was able to report on data from the United States, but how are other nations responding to regional environmental changes?

In November of 2014, the IPCC released the *IPCC Fifth Assessment Report* to summarize new findings and recommendations for policymakers since their *Fourth Assessment Report* in

2007. Scientists and international delegates synthesized the findings from more than 30,000 scientific papers in preparation for the concise 116-page international report on climate change (Upton 2014). The report detailed observed environmental changes and anthropogenic causes. It also projected future climate changes, risks and impacts, while providing recommendations for mitigation, adaptation and sustainable development. The report emphasized that effective mitigation and adaptation would depend on regional policies and partnerships on many levels that integrate responses with other “societal objectives” (IPCC Synthesis Report 2014). Cooperation on a regional and global scale will be required to adequately tackle contemporary climate change issues, but nations vary on their level of concern and capacity to address climate change. John Upton, Senior Science Writer for the non-profit climate reporting and research organization *Climate Central*, summarized the report’s findings, “The poorest countries — those that have contributed the least to the problem of climate change — suffer higher exposure to extreme weather events linked to climate change than do wealthy countries, yet they lack resources to sufficiently cope with those events or to plan ahead for migration [and mitigation]” (2014). There is an imbalance between exposure to increased climate change patterns and the capacity to adapt and apply mitigation actions.

The IPCC report indicated that mitigation would “differ across sectors and regions, reflecting development status, response capacities and near- and long-term aspirations with regard to both climate and non-climate outcomes” (2014). Factors that contribute to a nation’s response to climate change mitigation include: “effective institutions and governance, innovation and investments in environmentally sound technologies and infrastructure, sustainable livelihoods and behavioural and lifestyle choices” (IPCC Synthesis Report 2014). Regions that are experiencing fewer climate change markers (sea-level rise, more violent natural disasters, drought) and have greater economic stability have a higher relative capacity to cooperate and mitigate or adapt to climate change risks; though, the IPCC report noted that “capacity does not necessarily translate into the implementation of adaptation and mitigation options” (2014). The IPCC report

recommended greater cooperation and coordination across sectors and regions, noting that there are already many institutions and nations working collaboratively, yet global greenhouse gas emissions continue to increase (IPCC Synthesis Report 2014). Upton summarized the IPCC 2014 report by stating:

The report notes the rapid development in recent years of climate adaptation efforts, such as improved coastal planning and infrastructure overhauls that respond to changing weather patterns and high tide marks. ‘People, governments and the private sector are starting to adapt to a changing climate,’ it states. But the more we continue to change the climate, the more the “challenges for many adaptation options” will continue to rise. Simply trying to adapt to climate change, without taking steps to address the cause of climate change, was portrayed in the report to be a deeply dangerous tactic (2014).

Across the globe, nations are rapidly developing climate adaptation strategies. The IPCC report cautioned governments to focus not just on adaptation but also on mitigation; without considering alternative avenues to decrease the variables that contribute to climate change, global greenhouse gases will continue to increase and adaptations that were suitable at one point in time, may not be appropriate in the future.

Climate change is a complicated and layered issue. If leaders in relevant fields begin to understand all of the variables that lead individuals and nations to form opinions on climate change, there is potential to rethink the multitude of appropriate approaches to the conversation. The field of art has been broaching the conversation by responding to environmental changes and presenting work through various platforms of engagement for over 50 years.

The Evolution of Environmental Art

Environmental art has evolved since its inception in the 1960s, branching outward, exploring new platforms, and integrating non-arts disciplines through collaborations and symbiosis. *Environmental art* is an umbrella term for art that addresses the human relationship to the natural world (Bower 2011, 1). Though the term is generally thrown around in conversation to discuss any art that addresses the environment, it is important to understand there is a long history of artists interacting with nature. The proactive consideration of the intersections of art and environment began fifty years ago and has branched out to many sub-fields of environmental art, addressing the artists' specific intentions, sites, collaborations, methods and materials.

Historically, artists interacted with the environment and with scientists through natural, archaeological and scientific illustrations, recording through observation in a meticulous manner. Etchings, illustrations and *en plein air* (to paint outside in the 'open air') paintings had captured important landscapes, archeological sites and biological information. In 1838, the first functional camera forever changed the nature of visual representation and the role of the artist. Malcolm Daniel from the Department of Photographs at the Metropolitan Museum of Art stated: "From the moment of its birth, photography had a dual character—as a medium of artistic expression and as a powerful scientific tool..." (2004). By 1890, the idea of photographs in motion propelled primitive motion picture cameras—film (PBS n.d.). Since then, photography and film have taken leading roles capturing visual data in the environment. In the last two decades, the Internet and mobile devices have exponentially expanded the realm of visual language, storytelling and communications on a global scale. The role of the artist recording and responding to nature has been shifting for centuries; in the last fifty years, the interplay of art and environment has diversified and branched outward, crossing disciplines and literally crossing the landscape.

The Environmental Art Movement emerged in the late 1960s from social and political turbulence, calling artists to respond to rising environmental concerns and cultural shifts, which expanded the artist's role in society (Bower 2011, 2). Coming out of Minimalism at the end of the 1960s—a decade-long art movement that emphasized simplicity, industrial materials and a lack of artistic emotion—Post-modernism shifted gears in the 1960s/70s to pluralism and social activism. While a Post-modernist definition is still a hot topic amongst art theorists, it can be said that Post-modern art—which encompasses the Environmental Art Movement and many artistic styles/movements over the past 40+ years—rejected the previous notions that men were the only artistic geniuses and that non-white races were inferior. Feminist, minority and environmental groups began to respond to cultural shifts through art and theory. Post-modernism rejected a singular meaning in an artwork that was determined by the artist alone, instead inviting viewers to seek their own meaning or even participate in the work (The Art Story 2016). Environmental art, beginning in the late 1960s, fit the bill for a post-modernist movement that sought to engage viewers in new ways and challenge old ways of thinking.

One of the first environmental artists, Robert Smithson—an artist who sought to escape the confinement of the gallery space—created art in remote landscapes and wasn't necessarily concerned about the environment itself. His concern was not to protect nature through his art; rather, the remote location was inspiration and separation from mainstream space (Blandy, Congdon and Krug 1998, 232). In a 2013 essay in *American Scientist*, Robert Louise Chianese reviewed Smithson's most famous work, *Spiral Jetty*, created in 1970, stating the 1,500-foot coil of black basalt rock and soil created on the edge of the Great Salt Lake in Utah lacked environmental consciousness in its simple engineering (see Figure 1). Chianese described the structure as elegant yet inert, created in just six days with no effort to enhance the environment or work *with* the landscape. Smithson created a perfect Archimedean spiral, a nod to arithmetic, versus a logarithmic spiral, a nod to nature—the nautilus (Chianese, 2013). As the icon of the Environmental Art Movement, *Spiral Jetty* responds to the art world more than it responds to

environmental issues. The earthwork's function was primarily conceptual and aesthetic (Bower 2011, 3). Interestingly, over time, Smithson's *Spiral Jetty* has strayed from the artist's original intentions. Smithson himself expressed his desires for *Spiral Jetty* to disappear through natural entropy processes; conversely, "Smithson support groups" continue to rally for the artwork's importance, restoration and maintenance—a subjective responsibility of several partners and the current artwork's owner, the Dia Art Foundation (Dia Art Foundation 2014). This example shows the complexity of the artist's original intentions and the role of the art itself (separate considerations) to address the environment. As stated in the introduction, *environmental art* is an umbrella term to address the human relationship to the natural world; all environmental art is not created with the same motives to save the planet, as might be assumed by the movement's title. Even at the beginning of this movement in the 1960s, the role of art in the conversation on environment was complex, engaging individuals in deeper reflection and dialogue—a comparable role of art in the contemporary climate change movement.

In the past three decades, sub-fields of environmental art have branched out from earth art to ecological art (eco-art), sustainable architecture, bio-art, acoustic ecology, green theatre, environmental documentary, expeditionary art and eco-art education—art with a clear focus on responding to the environment and human impacts on environment (Bower 2011, 3). Some art is meant to change or decompose, while others are designed to last for centuries. Environmental art can be a collaborative process to restore the land and water or a computer software model to code and analyze quantitative environmental data. Still other environmental art is studio-based and gallery-ready, while other artist-scientist-community partnerships rely on funding, marketing, outreach and action. The integration of art with science, communities, contemporary environmental issues, technology and activism has brought awareness to the role of art to engage individuals with ecological issues. A prime example of a popular environmental artwork comes from Mark Dion—arguably the most well known contemporary environmental artist.

Mark Dion's *Neukom Vivarium*, 2006, re-contextualized an 80-foot-long old growth Douglas fir by placing the fallen specimen into a unique eco-gallery created specifically for the project in Seattle's Olympic Sculpture Park (see Figure 2). While the tree is dead, the physical remains are a living ecosystem of bacteria, fungi, arachnids, insects, mice, shrews and birds. Dion worked with architects to build a greenhouse around the tree, which remains on its side as it fell. The artist asserted that the project was meant to be an expensive experiment, "...we're pumping it up with a life support system—an incredibly complex system of air, humidity, water and soil enhancement—to keep it going" (Art21, 2006). In spite of the great expense and resources used to maintain this unique ecosystem, eventually the dead tree will rot and decompose. The experience may engage people in ecology, but Dion wanted the viewer to feel 'pangs of melancholy' and mourning, to walk in and feel like Alice falling through the rabbit hole. The experience should highlight the challenge of humans replicating natural systems. While not every artist will agree, Dion expressed that the artist's job is to challenge the public and spark dialogue and discourse (Art21, 2006). This piece has the conceptual strength and the physical girth to engage people. The space is an ecosystem, a laboratory and an educational destination. Ironically, while the piece stirs up conversations about conservation, there is a vast amount of energy and resources being used to maintain the project by mimicking natural systems—similar to Smithsonian, the artwork is not necessary environmentally-friendly.

The history of environmental art reveals decades of artists responding to the environment in different ways. I've pulled just a few examples here to illustrate that environmental art is more complex than the artist commenting on the negative human impacts on the environment—there is a deeper discourse that develops when artists enter a conversation.



Figure 1 – Robert Smithson. "Spiral Jetty," 1970. Basalt rock, soil. Great Salt Lake, Utah. Courtesy Gianfranco Gorgoni.



Figure 2 – Mark Dion. “Neukom Vivarium,” 2006. Douglas fir, mixed media installation, and greenhouse structure: 80 feet long. Olympic Sculpture Park, Seattle, Washington. Courtesy the Seattle Art Museum.

The Need for Art in the Climate Change Movement

“The redesign of our world will need artists to provide imagination, creativity and emotional connections—both to the mess we have created and to the possibilities we can create together.”—Tensie Whelan, President of the Rainforest Alliance (Markonish and Thompson, 127)

The Artist’s Perspective

How are artists interpreting the role of art in the global climate change movement? Some artists are working closely with scientists, maintaining fidelity to the quantitative data, while other are visualizing data to create experiential art to engage publics in environmental change issues. However these artists manifest climate change information, it is clear there are components of research, observation, interpretation and, sometimes, strategy.

Contemporary art and climate change projects emphasize personal engagement to climate change through a variety of media and methods that may or may not maintain fidelity to the quantitative climate data. Graphic artist Tristan Telander described art as a means to compress climate data and represent large spans of time in a more easily understood artistic representation. By using computer software to create acoustic ecological art and new visualizations from raw climate data, Telandar, Nolan Lem and Kip Haaheim created experiential art that surrounds the viewer in ethereal climate change—a unique version of quantitative climate data. The sped-up audio-visual representation of climate change is supplemented by a real-time performance piece—a melting 300-pound block of ice. Telander explained by stating the limited human capacity to understand slow, yet impactful changes in climate limits the sense of urgency people have to understand the issues and take action. Haaheim noted, “The cross-pollination between the usually different audiences for the arts and sciences expand the possibilities for both” (US Fed New Service 2011). The atmosphere and emotional connection created by this multimedia installation begins to explain the role art can play in the global climate change movement.

Artist Eve Mosher took a different approach to climate change in 2007 with the HighWaterLine project, taking a field marker loaded with blue chalk and demarcating the projected water line if sea levels rose in Manhattan. Around the island, Mosher created a temporary line—using real climate data from the Metro East Coast Assessment—to discern which areas of NYC would be under water if oceans rose ten feet above sea level. Interestingly, much of the area she marked in 2007 was inundated by Hurricane Sandy in 2012 (Mosher, HighWaterLine 2015). Not only was this artwork performed and left a visual residue, it was documented and shared widely through the Internet, expanding impact and continuing with similar projects in Philadelphia, Miami, Del Ray (Florida), and Bristol (United Kingdom). Mosher conceived her role as the artist to use new creative approaches to help local communities visualize climate change: “I realized that while I didn’t have the skills to be a lobbyist, lawyer, or politician, I didn’t have the money to make huge investments or sway opinion, what I did have was creativity and my art” (Mosher, HighWaterLine 2015). If artists understand their role as cultural influencers—including strengths, weaknesses and outreach platforms—they have the potential to be strong collaborators and influential leaders.

Artist David Buckland, founder of the international art and climate change organization Cape Farewell, began the *Art and Climate Change Expeditions* in 2004 because he felt there was a need to find different ways of communicating climate science. Buckland felt the methods of delivering scientific facts were being ignored. “I hatched a plan. I would ask artists, because they are our most creative communicators, to join a group of scientists and educators to sail north on an extraordinary expedition to the front line of climate change” (Buckland 2006, 5). Buckland saw a need for a new approach to communicating complex climate data by uniting people from different disciplines with a shared goal. Other institutions have begun bringing artists and scientists together to engage in climate change through a shared platform.

The Chemical Heritage Foundation devoted ten months in 2013 to an art exhibition that explored artists’ and scientists’ motivations behind observing, investigating and interpreting the

changing environment. A deeper look at the project revealed 17 one-on-one interviews (available for viewing on the website) with artists and scientists in the project. These interviews dissected the roles and responsibilities of the artist versus the scientist. In one interview posted on the website, artist Diane Burko noted: “I’m trying to straddle issues of [climate change] data with issues of aesthetics. As a painter, I don’t want to give that up; I’m not going to start going on the lecture circuit...it has to be through my language, as an artist” (2013). Burko thoughtfully considered her priorities and her role as an artist addressing climate change. She decided to prioritize particular aspects of aesthetics over strict representations of climate data. Viewing another video interview, Penn State Professor of Meteorology Kenneth J. Davis was asked if art had the capacity to address the human element of scientific questions. Dr. Davis paused and suggested, “Well, surely, if you think broadly of art forms. Of course, we have to use art to communicate about important societal issues, to the extent of science...and climate change is one of those. Absolutely. Can’t think of a whole lot of good examples of those though, to be honest, to date” (2013). Davis sat silently and further contemplated the role of art in creating excitement about science and found he can’t think of any type of art that has impacted him on a scientific concept. “Maybe I’m just forgetting,” he noted. With a chuckle, Davis continued by cautioning that such complex scientific concepts like CO₂ molecules, radioactive transfer, and atmospheric transport (shaking his head side-to-side) are unlikely topics for artists to communicate effectively. As a scientist, Davis clearly sees limits for art to be useful when describing convoluted scientific concepts. These honest perspectives from both an artist and scientist in this exhibition reveal the priorities and relationships that both have toward issues of climate change.

Artists are looking for ways to research and integrate climate science into their artwork to respond to the growing concerns of climate change. Some artists research the science online, as Eve Mosher did, while others consult scientists, like the Chemical Heritage Foundation, or create communal spaces for the exchange of ideas, like David Buckland. Artists and scientists are developing more relationships and increasing their interactions. What I thought was a trend

toward collaboration appears to be more of a growing discourse and exchange of ideas between artists and scientists.

The Scientist's Perspective

The objective, rational nature of science itself creates barriers of communication to the non-scientific community. Quantitative data, theory, lectures, graphs and academic journals speak to the scientific community but may be too difficult for the average person to understand. Climate change communication is a hot topic in the scientific community. With a large percentage of data pointing in particular directions of human-caused climate change, why are scientists struggling to engage the masses with the data? In the previous section, Davis revealed his skepticism on how art can communicate advanced scientific concepts. Let us dive deeper, exploring how other scientists view the role of art in the global climate change movement.

Scientists in the literature had both positive and negatives views on the role of art in climate change discourse, but all views pointed toward the power of art to create an emotional response in the individual. Like Buckland, Leslie Duxbury believed the collaboration between art and science was powerful. She considered the role of art to “traverse a realm of uncertainty and present ambiguities and possibilities to engage viewers...” (2010, 298). Duxbury believed art could imbue emotion into the climate change conversation, offering solace or inspiration, a welcome addition to hard data that can be overwhelming and despairing. Bill Chameides, Dean of Duke University’s Nicholas School of the Environment, highlighted the importance of environmental and performance artists who use art to make environmental change real. In a 2014 article in *Scientific American*, Chameides emphasized the need for art to address climate change: “*Experience* the science of climate change rather than learning about it.” Through engagement with art, individuals can make a personal connection to science. While Chameides believed art can be a powerful tool in activating the climate change discussion, he cautioned that there is a dark side to environmental art, a “tradition that features stark pictures of environmental

destruction and paints bleak scenarios of a future world of environmental ruin” (2014). By offering images of oil-soaked pelicans, melting glaciers, and mass deforestation, the message may become skewed in the public perception—something scientists feel can be counterproductive to scientists’ efforts to engage politicians and the public in the mitigation of climate change. Such desperate images may suggest the damage is irreversible. The use of imagery has become a focal point for some researchers who have acknowledged the impact visual representations and icons of climate change can have on the public. This will be discussed at length in the following section.

Art plays a different, yet complimentary, role in the shared goal to address climate change. Scientists seek to step away from emotions and biases, to lean the data toward objectivity. This is where art can fill a niche, connecting an individual to a scientific concept through emotion and empathy. Some scientists have begun to consider the role of art in climate change communications by spending years researching public sources of climate information and resulting changes in an individual’s attitude and behavior. The next section will take an in-depth look at two research studies to better understand the challenges of evaluating art that addresses climate change.

Impact Studies on Art that Addresses Climate Change

Can art that addresses climate change have a measurable impact on viewers? What would those methods and evaluations of short- and long-term outcomes look like? These are challenging questions for artists and arts administrators especially since a direct causal relationship of an individual's position on climate change and associated mitigation behaviors may not easily be linked to a direct source. Researcher Rachel A. Howell developed a longitudinal study that took place over the course of one year to investigate attitude and behavior change associated with the United Kingdom climate change movie, *The Age of Stupid*. Her results raise more questions than provide answers on the difficulties of long-term climate change impacts. A second study described herein details Saffron O'Neill and Sophie Nicholson-Cole's research that explored climate change communications by investigating visual and iconic imagery that induced feelings of fear in participants. They questioned whether visual "fear campaigns" were appropriate and effective methods for engaging individuals in climate change. Their study produced complex results that make effective climate change communications seem even more challenging. What does this mean for artists? Should artists be aware of this research and consider it when producing climate change art? To close this section, I offer an example of positive climate change impact that *can* be linked to a singular art project; however, this is evaluated from an ecological impact and not from the standpoint of studying impact on a person's attitude or behavior associated with climate change. Artists, scientists, arts administrators and funders must understand that art addressing climate change is complicated and challenging to evaluate in terms of impact and outcome.

Howell declared there is a need to discuss the challenges of long-term impact studies that look at behavior change related to climate change communications, "a vital and under-researched area" (2014, 70). She investigated the short- and long-term impacts of the film, *The Age of*

Stupid, by surveying the public on their perception and related actions to mitigate climate change through a longitudinal study over the course of one year. *The Age of Stupid*, the United Kingdom's near equivalent to Al Gore's *An Inconvenient Truth*, intended to turn millions of viewers into climate activists. Four surveys were performed, recruiting participants randomly from those in line to see the film in 2009. The surveys were conducted before the film, right after the film, ten weeks later and one year later. The longitudinal study matched each respondent with a number as to compare individual responses over time. 241 participants began the survey, and 104 participants completed the final survey (2014, 76). Howell noted certain biases in this study. Participants were selected at random from people already in line to see the film, thus, participants were *already* aware and engaged in climate change to some degree. The participants who engaged in the final survey stated in their initial survey they were highly interested and concerned about climate change before the film. Further, Howell stated the random selection included a majority of highly educated, employed women (2014, 79). Howell's analysis of the first three surveys showed that any increased concern about climate change felt right after the film was a temporary effect (2014, 79). Some viewers may have already been taking action yet in the survey attributed their motives to the movie. Ten-week responses indicated actions were being taken but not because of the movie, yet the same respondents indicated they had started the same actions *because* of the movie in the one-year survey (2014, 85). Howell noted that by requesting participants attribute their pro-environmental behaviors to specific origins, the study become more complicated:

Leaving aside the issue of unrecognized influences on behavior, it is not surprising that over time people forget exactly what consciously prompted them to adopt certain actions; it may be that respondents who were sympathetic to the aims of the movie were over-inclined to attribute behavior to its impact as their memory became faultier with temporal distance from the screening (2014, 91).

Howell concluded with a section entitled, *Problems With Longitudinal Studies of Climate Change Communications Impact*. Here, she stated her research exposed the issue of recruiting participants and retaining them throughout the yearlong study. Those remaining in the study until

the end appeared to be the most concerned from the start about climate change; thus, Howell extended to say it would be challenging to sample the “general public” from any such climate change-related event (film, workshop, exhibition) due to the nature of the audience potentially being interested in climate change from the start. Further, Howell concluded there are innate problems in a “self-report” (having participants respond about their own behaviors):

“Respondents tend to overestimate their pro-environmental or pro-social behavior, perhaps because of a desire to offer socially desirable responses or because their self-identity as a ‘green’ or ‘socially responsible’ person leads them to assure that their behavior correlates more with their values than it actually does” (2014, 90-91). I would add that the act of being included in the research study and the want for personal results to be useful to climate change mitigation might bias the results of any climate change impact study. Howell made no claims that her survey was conclusive; on the contrary, she offered the results as a means to show the challenges of short- and long-term impact studies on climate change communications.

O’Neill and Nicholson-Cole took a different approach to long-term impact studies by researching ‘fear campaigns’ using visual and iconic imagery of climate change found in the public domain. The authors stated there is little literature examining longitudinal attitudes towards climate change and “decarbonization-oriented” behavior (2009, 361). The researchers used visual data analysis to analyze participants’ feelings on particular images. Images can communicate stories and complex concepts in a simpler manner; they can play to emotions and memories; they can become iconic, increase awareness or create personal opinions about particular issues—thus, the researchers felt visual data analysis would be a valid method to measure climate change impacts (2009, 357). Examples of climate change icons in imagery included the stranded polar bear, rising coastal waters, lands wrought with drought, and natural disaster remnants of once-standing towns. No research like this had been performed on visual imagery that induces fear about climate change until the following studies.

Between 2000 and 2004, two empirical studies were performed in the United Kingdom by O'Neill and Nicholson-Cole to determine if fear appeals through the use of imagery and icons were the most effective method for public *saliency*—the sense of importance of the issue—and public *efficacy*—feelings of being able to do something about the issue—regarding climate change. The first study included semi-structured interviews and focus groups, involving 10 participants from three diverse groups. The second study included 27 participants in focus groups and 63 responses to an online survey. Both groups were first asked to describe mental images of climate change. Many responses included large-scale impacts such as melting glaciers, sea level rise, coastal flooding, intense heat and drought, famine and species extinction (all icons of climate change). When faced with images found in mass media reports of climate change, results concluded that fearful imagery like famine/starving children ranked highest as making the matter seem personally important. Images of thermostats and low-energy light bulbs ranked highest as making participants feel like they could personally do something about climate change (2009, 373). The key findings over both imagery and icon studies reveal that the very images that made participants feel climate change was important were also the same images that made climate change feel impersonal and disengaging. The participants also noted the imagery that made them feel most in control of their personal actions (thermostats and light bulbs) did not have enough drama to hook them into the issue of climate change to begin with (2009, 370). Final analysis of their study revealed “dramatic, sensational, fearful, [and] shocking” imagery could successfully capture peoples’ attention (the hook) and create a sense of importance of the issue (for example, an image of starving children); however, the same image also distanced and disengaged people, making them feel helpless and hopeless (2009, 375). The results reveal layers of complex emotions and tipping points for people to engage in an issue.

O'Neill and Nicholson-Cole concluded that fear may be an inappropriate tool for climate change communications, yet I would argue their study could be adapted and performed again to offer more conclusive results. The images chosen for the study could have included stronger

selections used in media such as natural disaster photos or cracking glaciers. I do not see the inclusion of a crowded street café or a field of sunflowers (actual imagery in the study) as extremely relevant icons of climate change. Further, the researchers highlighted that focus groups (37 participants) yielded much richer conversation than the online survey (63 participants), which generated very little usable data. Thus, gathering opinions from additional, diverse focus groups in the future would be more indicative of general public opinion on fear-inducing climate change imagery and icons. Unlike O’Neill and Nicholson-Cole, Howell asserted that much of the literature suggested fear appeals *do* increase saliency and efficacy, though Howell cited older studies from 1984, 1995 and 2001 (2014, 71). Howell did not reject the fear appeal nor did she think it disengages viewers; instead, she recommended to focus on the frames of climate change communication, stating fear appeals need to be combined with high-efficacy messages on how to avoid the threat in order not to trigger counterproductive behaviors (2014, 72).

O’Neill and Nicholson-Cole’s research indicate fearful, overwhelming imagery may be counterproductive; they recommended approaches to climate change imagery should involve an aspect of the individual’s everyday world in both space and time. They concluded that when imagery becomes too distant in terms of location or extends imagination too far into the future, levels of efficacy drop—though levels of saliency, the sense of importance of the issue, remain (2009, 372). Participants in the focus groups strongly disagreed with fear campaigns and offered suggestions for environmental campaigns to use icons that engage with local people’s everyday lives. O’Neill and Nicholson-Cole stated that participants generally felt that humans are the main cause of climate change and something should be done about it, yet they also stated their conception of climate change was a large, global issue that felt distant in time and location. Some felt their actions were insignificant—“a drop in the ocean” (2009, 371). Three people in the study stated that thinking about climate change was so scary and depressing that they purposefully chose *not* to think about it. The researchers elaborated by stating, “Fear appeals may act to

increase this response, leading to denial of the problem and disengagement with the whole issue...” (2009, 371). The challenge of *how* to talk about climate change—including *when* and to *which* audiences—cannot be ignored. Artists have a defining role here, a role that I’m not convinced environmental artists and climate scientists are fully aware of.

Eco-art in particular, when collaborating with fields of science, does attempt to track the *ecological* impact of a collaborative art-climate change project. In this manner, impact studies do not necessarily have to relate to someone’s opinion or actions on climate change, but rather can quantify the ecological impact on the land, water quality and wildlife at the site. The “Welcome Home Wildlife!” project—a program of EcoArt South Florida—integrated the arts into site restoration plans for the littoral area of Torrey Island Nature Park. Three massive hurricanes in 2004 and 2005 devastated the area, affecting plants, trees and wildlife in the region. In collaboration with the City of Belle Glade, the Lake Okeechobee Regional Economic Alliance, Inc., Torrey Island Recreational Management Corp., and the Palm Beach State College, eco-art was integrated into the revitalization and mitigation plans for the park. Volunteers and interns researched, hiked, strategically planted trees, shrubs and plants, and helped install eco-art wildlife habitat sculptures. These sculptures were designed to attract specific species and used scavenged natural materials in the region. The art was meant to decompose over time, providing interim habitat for native wildlife as the newly planted trees and shrubs took root for future habitat (EcoArt South Florida 2015). According to Bowers, “Environmental art often takes into consideration...the origin of materials used and the ecological impact of the ways an artwork was constructed and disseminated, as well as long-term effects on non-human life and systems” (2011, 3). The impact of this type of collaborative project can be tracked through wildlife counts, new growth, new tourism numbers and increase in park revenue. Thus, measuring impact when talking about art-climate change projects does not necessarily have to mean measuring someone’s opinion and causal relationship back to the art. These are particularly important points for artists and arts administrators to understand as they develop art and climate change projects.

Impact studies on public saliency, efficacy and mitigation attributable to art that addresses climate change are rarely found in the literature and may not actually provide usable information, as Howell has shown. The causal relationships of art and climate change perception are difficult to assess; however, understanding the impact of art that addresses climate change should be recognized and evaluated in some manner. O'Neill and Nicholson-Cole attempted visual data analysis as a means to understand impact. Their research revealed the content of the imagery to be important in creating personal engagement or disengagement; further, the context of imagery in time, place and route of transmission to the public compounded the effects. The results of their research are fascinating and have led O'Neill to further research in the area. Chameides offered a recommendation to enhance O'Neill and Nicholson-Cole's research: "I'd really like to see a study like this that includes artists in the selection and production of the images used. If the object is to find out how to inspire people into action, why not include the experts of inspiration?" (*Conservation: Artful Planet* 2014). Scientists have been making connections between art and climate change for over a decade and are calling for artists to expand their roles and become active players in climate change research. Studying the impact and relevance of climate change art and communications is challenging, but as we've seen, researchers have begun to take on the task through self-reporting as well as ecological impact studies.

Summary

Artists, scientists and arts administrators must understand several variables when attempting to use art to effectively engage people on climate change: climate science, the function and typology of environmental art, the need for art to address the issue from multiple perspectives, what roles art and science will play, and the realities of measuring impact. From the literature, I have developed a deeper understanding of the need for art to address climate change. Climate data can be complex and science may create barriers of communication and action by being objective or authoritarian on the subject. People generally do not want to be told how to feel and how they should change their behaviors, even when data suggests massive global concerns with clear mitigation actions. While levels of art-science collaboration will vary, the fact that research has turned to longitudinal studies and visual data analysis yields important results for climate change personal engagement that affects both artists *and* scientists. Art provides a personal connection to the conversation through sensory and conceptual means, but it's still unclear to me how contemporary artists and scientists would describe the role of art and artists, logistics surrounding art and climate change projects, and measurable impacts of art in the current global climate change movement—thus, I feel there is a need for this research.

The literature shows the capacity of art is to create a personal connection to climate change, to offer an avenue of *individual* awareness and engagement on a *local* level. Artists interested in addressing climate change should consider their unique attributes that draw viewers to their work; building upon that, artists may have greater individual impact by researching and addressing local environmental changes and by consulting with local scientists. Artists would also benefit by reviewing the available literature on the effects of climate change imagery and icons on public saliency and efficacy. A thoughtful approach to art-climate change projects will have stronger impact than a project without a plan.

Arts administrators could play a keystone role in developing strategic plans and logic models for artists to embrace and extend their capacities in art-climate change projects. They could facilitate collaborative artist-scientist partnerships to thoughtfully consider each partner's role, inputs, outputs and outcomes of the project. Methods of evaluating true impact of any art and climate change project are unreliable—as shown in the literature—but that does not mean artists, scientists and arts administrators should not attempt to develop more strategic plans, collaborations and methods of assessment to understand if their particular project is having a measurable impact on audiences. At a higher tier, arts administrators could begin to document art and climate change projects, research comparable studies, and contribute to the limited published literature on this topic.

The following primary research analyzes in-depth, qualitative interviews with three artists who address climate change in their work and four scientists to explore the roles and capacities of art and artists to contribute to the global climate change movement.

Chapter One—The Role of Art in the Global Climate Change Movement

A discussion of the role of art in the contemporary global climate change movement cannot begin without acknowledging the most widely recognized international art and climate change charitable organization, Cape Farewell. Artists and scientists are at the core of this organization, located in the United Kingdom. A self-described “think and do tank,” Cape Farewell has had a critical role to play in the art and climate change intersection in the last 15 years. The organization is extremely active, with several global offices, growing lists of funders and collaborators, and a rotating roster of artists and scientists who voyage to remote locations to experience and respond to the effects of climate change.

Artist David Buckland founded Cape Farewell in 2001 to “instigate a cultural response to the climate challenge” by bringing “creatives, scientists and informers together to stimulate a cultural narrative that will engage and inspire a sustainable and vibrant future society” (Cape Farewell 2016). Cape Farewell has led eight expeditions to the Arctic, two expeditions to the Scottish Isles and one expedition to the Peruvian Andes (Cape Farewell 2016). Beyond the films, art, and scientific research created and collected during and after expeditions, the organization seeks to evaluate the program’s overall impact through several methods: quantifying website and social media statistics, quantifying direct public engagement and the quality of that engagement through audience evaluations and tracking, assessing their relevance in peer-reviewed journals and publications, assessing their relevance through partnership requests and requests for global conferences and events, and by developing specific target audience programs through strategic collaborations (Cape Farewell 2016). Cape Farewell has become an international model for management and collaboration of art, culture and science. Their relevance and leadership in the global climate change movement is steadily rising.

Using Cape Farewell as my jumping off point into art and climate change research, I had anticipated uncovering progressive artist-scientist collaborations, thoughtful strategic planning models, and new outreach platforms to engage audiences on the pressing issues of climate change. My first interview with Dr. Joe Smith, Senior Lecturer in Geography at The Open University in the United Kingdom, steered my research into unexpected and exciting directions—away from searching for an ideal artist-scientist paradigm—where I assumed artists would act as a conduit to communicate with the public on climate change—and toward more philosophical thinking about the role of art and the role of the artists themselves.

Dr. Smith was a participant in the 2008 Cape Farewell Project Greenland Expedition and is an avid researcher, publishing books and articles on the intersection of media production and public understanding and engagement of global environmental change issues (Open University 2015). My initial expectations for my research were aligned with those of Cape Farewell, as expressed by Dr. Smith:

I think there was really an overemphasis on the idea that climate change was a natural science topic that the arts would help to communicate the urgency of [during my Cape Farewell expedition]. And, actually, I think that really diminishes what's interesting about drawing the arts and humanities into a conversation about climate change. It diminishes its potential (Smith 2015).

He went on to clarify that “creative people are valuable in improving the...sparkiness, directness, the engaging qualities of climate communications,” and those efforts and experiments were valid and needed; *but*, he emphasized, what appeared to be the tendency was for the work to end there—with the final art work (Smith 2015). Dr. Smith declared that this abrupt stop struck him as a mistake. The most interesting thing going on with art and climate change was only beginning at that moment.

Dr. Smith considers art and culture to be integral to the climate change movement, where artists are creating a *richer* and *more* complex global conversation. This was a key concept for me to hear from the start of my research—wasn't the conversation supposed to become *clearer* by integrating artists, as creative communicators, into the conversation? At the onset of my

interview with Dr. Smith, my research questions aimed at exploring the details of artist-scientist collaborations on projects that addressed climate change. Dr. Smith had been an ideal conversational partner due to his work on the 2008 Cape Farewell Greenland Expedition. I had assumed we would be talking in detail about his relationships—and hopefully collaborations—with artists during the sea voyage. I had thought artists would be using their creative skill sets to view the quantitative climate data in new ways, offering new platforms to engage the public on pressing climate change issues. Dr. Smith immediately countered my internal assumptions about this simple view of the artist's role in climate change by stating that the role of artists in many cases is to encourage deeper discourse that makes the conversation more complex. The richer discourse, new cross-disciplinary relationships, and community interactions that stem from the art—the larger outcomes—are one of the most valuable assets of any art and climate change project. I was smitten with Dr. Smith's perspective and then understood that Cape Farewell was an incredible jumping off point but that I had *much* to uncover on just *how* artists were engaging audiences and deepening the global climate change movement. Artists aren't meant to jump in and make climate change easier to swallow; artists are encouraging audiences to think critically and to feel more deeply. Were artists increasing social awareness on some level (is that measurable?), actually helping the climate change movement by encouraging behavior change (is *that* measurable?), or were some artists actually *decreasing* the validity of climate change data through the subjectivity of their art? It was serendipitous to begin my study with Dr. Smith's interview, which opened up my mind to challenging new questions and alternative roles for artists and for their artwork in the global climate change movement.

In his series of climate change essays, "Culture and Climate Change: Narratives," Dr. Smith, his wife Renata Tyszczyk, and Robert Butler conducted panel discussions and compiled essays from people across several sectors, in part, exploring narratives of climate change through journalism, literature, fashion, theatre, children's media and design (2014, 8). The publication addressed the need for climate change to be a cross-disciplinary topic of engagement and

discourse: “The rapidly expanding body of artistic and cultural work that responds to climate change reflects a strong imaginative engagement across many disciplines. There is now a deeper and more diverse research base, including contributions from the humanities” (Smith, Tyszczyk and Butler 2014, 7). This publication—one I’d not found in my primary research and also one of many on similar topics of culture and climate change that Dr. Smith has authored—enriches the body of literature on the role of culture in the climate change movement. Dr. Smith told me there has been a general tendency not to invite the arts into a complex body of new knowledge like climate change—that it’s assumed the topic requires a certain level of scientific knowledge to validate a response. He exclaimed, “I think that is a mistake” (Smith 2015). Dr. Smith felt the role of art and culture in the global climate change movement cannot be underestimated.

While my first interview with Dr. Smith literally had my head spinning with art’s unexpected capacities to contribute to the larger climate change movement, Dr. Sallie Marston and artist Annie Cattrell offered more expected responses. Dr. Marston, Principle Investigator of a two-year collaborative research study investigating art and science collaborations (not all specifically climate science related), expressed her thoughts on what art collaborations can do for science by exposing ethical and political dimensions of science. Instead of being a “talking head,” scientists can consider the contribution of art in a conversation to be a means to discuss challenging issues with publics in a different way (Marston 2015). Cattrell, expeditionary artist on the 2011 Cape Farewell Sea Change Voyage, described art as a necessity for greater science communication, even though some scientists have no interest in art. Art can provide new perspectives on climate science data and the global and political issues that drive climate change (Cattrell 2015). These were expected paths I envisioned my research taking me—to in-depth conversations about art challenging viewers to reconsider climate change. As Dr. Marston commented, artists can expose ethical challenges and political layers that complicate a larger issue. Art is actually rather good at those things, as can be seen throughout the history of

postmodernist art stepping into the role of civic engager. Beyond offering a new perspective or a more intense conversation, does art have the capacity to create a call to action on climate change?

Artist and environmental activist, Peter Handler, approaches the role of art in the climate change movement as a catalyst for change through collective action—a step further than what Dr. Marston and Cattrell had discussed. Handler noted that unless you talk about solutions when you talk about science with people, they may or may not absorb that information. He emphatically stated that there's nothing we can do about that; nothing *he* can do about that. Exasperated, Handler declared the overarching problem of engaging people and inciting a permanent change in their behavior is overwhelming. While there's not a “whole lot” that individuals can do, he stated, there *is* a whole lot we can do collectively or in a community (Handler 2015). The question, “What is art's role in the global climate change conversation?” had become central to every interview with each of the seven research participants. *This* was to be the focus of my research. From just a few conversations, I had an epiphany. In fact, as my research progressed, I realized the key word in this question needed to shift from *conversation* to the word *movement*. Art isn't merely an alternative method to talk about climate change data and the larger issues; there are deeper things happening *because* of arts involvement in the movement. Thus, I allowed myself to fall down the global climate change movement rabbit hole—instead of merely *conversing* about it.

Handler's perspective on the power of community action—coupled with my intense talks and further readings on cultural influence with Dr. Smith—ignited my epiphany: perhaps the individual art and climate change project doesn't have to create a *direct* impact—perhaps the role of art in the global climate change movement is the increasing cumulative impact of all art that addresses climate change. This was an intense discovery. I began to realize *all* art and climate change projects contribute to the ongoing global climate change movement and *all* were relevant and important in their unique ways. From massive public art programs to small-scale local projects, each art action becomes a part of the climate change movement's history—slowly

increasing the cumulative impact of artists responding to climate change. The recent epiphany forced me to reflect on my own art practice, as an artist and environmental activist myself.

Having both a fine art and ecology background, I've always faced the challenge of integrating shared goals in both disciplines in my artwork. I began this research with the motive to uncover the most effective and efficient art and climate change project to catalyze civic action; yet, my research goals shifted away from creating an ideal set of parameters and more toward this idea of the cumulative impact as I continued to interview artists and scientists. As an artist, I am concerned with materials, aesthetics, concept and exhibition; as an environmental activist, local, national and global environmental issues affect me—particularly the lack of public engagement and action. I have struggled with finding the most effective means to integrate my art with distinct projects to create awareness and engagement with larger environmental issues, including climate change—crossing fingers this would lead to individual action on some level. As my research progressed, I began to realize the real contribution of art—the idea of the collective. Collective in terms of individuals coming together in large and small groups *and* in terms of individual artists creating work on smaller scales, across the globe, which contributes to the larger sum over time. The long-term collective of art that addresses climate change is more **powerful** than even the most effective one-off project or sustained climate change art program.

I began to reconsider the weight of individual art and climate change projects. The largest global art and climate change undertaking thus far in history was produced by a grassroots online platform organization called 350.org. The number '350' indicates the level of carbon dioxide in parts per million (ppm) in the atmosphere that scientists agree is the safest number we need to work toward. As of August 2015, the National Oceanic and Atmospheric Administration stated the global mean of CO₂ in the atmosphere is 396.86ppm—well over scientists' safest projection of 350ppm. With over 188 countries participating in their grassroots organizing, online campaigns and mass public actions, this organization is a leader in collaboration and effective programming, many of which highlight the arts as integral to efficacy. On the eve of the

annual United Nations Climate Change Conference in Cancun, Mexico, November 20, 2010, thousands of people from communities around the world came together to try something new. With the help of 350.org, 16 cities across the globe participated in a simultaneous act of public performance art—Project 350eARTh—creating images large enough to be photographed from space by satellite (350eARTh 2010). Groups large and extra large (from hundreds to thousands) convened locally in open areas to create images with their colorfully clothed bodies: Iceland—a polar bear on a melting glacier, Los Angeles—a soaring eagle, Cairo—a scarab beetle, Delta de Ebro, Spain—the face of a climate refugee, Vancouver—a giant green footprint. In Santa Fe, one group wore blue and lined their drought-stricken river with their bodies, representing the waters that had dried up. In the Dominican Republic, participants morphed into a house with rising seas below—a person trapped on the roof waving for help. In Figure 3 at the end of this section, artist Daniel Dancer coordinated 3,000 students from the Ryan International School in New Delhi to use their bodies to create a giant elephant. Dancer is known for these types of large-scale collaborative projects, and describes them as “living paintings” where hundreds of people collaborate to create something beautiful and experiential (Art For the Sky 2007). In the context of Project 350eARTh, the project goes a step farther in the hopes of increasing public and political saliency and efficacy. Another participating city project coordinator noted, “The idea is to get everyday people to take part in action, just to prove to politicians that if we can do things to make a difference, then so can they” (350eARTh 2010). Project 350eARTh garnered global news coverage from television broadcasts to newspapers, blogs, websites and social media buzz. But how effective was the message on the target audience—global policy makers?

Project 350eARTh initiated global coverage of the stories and ignited a period of intense discussion on mass public action and climate change, yet it remains unclear if and how the project affected their target audience—global leaders and policy makers. Bill McKibben—Co-founder of 350.org—was asked about measurable impact on the project. He commented by saying he was confident that the photographs from space of the art installations would resonate with viewers and

inspire people to change; however, he added that—based on the lack of progress made at that point in 2010 on a global deal to reduce harmful CO2 emissions—“[I am] not optimistic about much influence the art might have on the Cancun talks” (Fallon 2010). By this admission, it is clear there was no strategic plan by 350.org to evaluate impact on policy makers, public audiences or participants. I think this is a great example of a massive and important art and climate change project that missed a valuable opportunity to research impact.

In juxtaposition to grandiose climate change art, Laura Petrovich-Cheney, sculptor and expeditionary artist responding to issues of pollution and climate change, considered art’s contribution to climate change as producing a visceral reaction on the *individual* level. “Sometimes it’s easier to see things than it is to hear them” (Petrovich-Cheney 2015). She asserted numbers and facts can elicit a glazed look from audiences, while art can bring an emotional and visceral response to the same set of information—just handed out in different ways. Petrovich-Cheney participated in a 2013 Arctic Circle residency in the International Territory of Svalbard, Norway, just 10 degrees south in latitude of the North Pole. She articulated her words in a way that poignantly brought her experiences to life for me:

...the idea of scale. So incredible. We had to have roommates...you know how the beds are so tiny on a little ship. At first, it was just the bed, and then, it was the room, and then, it was the ship, and then, the Zodiac [the smaller boat that takes passengers to the shore from the ship]. The scale kept growing, and then it would pull back. The scale was expanding and contracting from that teeny tiny bedroom with a teeny tiny porthole, to the giant outside [of the Arctic] and back in. There’s always this sense of like, tides. Tides come in, and then, they go out. And that’s what the scale continuously felt like (Petrovich-Cheney 2015).

Petrovich-Cheney was narrating her experience to me, which created a personal connection. I was forming images in my brain to play out her story. I felt like I was there, in the teeny tiny bedroom with the teeny tiny porthole. The artist further pulled me in, revealing that each day she hiked on the ice—with a small group of artists, the program director, and three guards carrying rifles for polar bear protection—she gave one word to the experience in her journal. She never

carried a camera, since she felt it impedes on the experience; the only documentation of her Arctic hikes in Norway are a trail of 8 words, published for the first time here:

Fast
Rocky
Snowy
Cold
Breathtaking
Trapped
Exhilarating
Unguarded

(Petrovich-Cheney 2015)

It's hard not to read this poem and slow down to annunciate each syllable. How powerful a single word can be to connect an audience member to an artist's experience thousands of miles away. The artist and her peers also spent time on the trip cleaning up the garbage that accumulated on the shores. Once Petrovich-Cheney saw the amount of debris being collected, she knew she had to use the material in her work. From the piles of debris along the Arctic shores, the artist created installations and sculptures which later lined the Noyes Museum of Art at Stockton University, New Jersey. While researching the 350.org global mass public action project made me feel connected to carbon dioxide emissions data, global communities and politician perspective, Petrovich-Cheney's story was allowing me to understand the concept that several interviewees touched upon—the artist's unique position to use art to personally engage a viewer through experiential emotion, empathy and narrative.

Without any prompting on my part, several interviewees used phrases like 'personal' and 'storytelling' to decipher the role of art in the global climate change movement. Dr. Katie Sokolowski—a hybrid, artist and scientist—described the way her opinions have changed over the years. When asked if she felt art could have a measurable impact on someone's opinion of climate change, she turned to storytelling as an explanation. She exclaimed:

I like this question because it lets me see how far I've grown as a person because if you had asked me that question in high school, I would have been like, 'Art does nothing! It's all about science! This is what's real!' But *now*...I'm like, 'Man, it doesn't matter what science tells you.' It's how you *feel*, and how cultures really shift your mentality. This might sound more psychology than neuroscience, but there's a brain chemistry to this. That we are social creatures, and we will go with what society tells us what to do, what the norms are...and where we learn that...we learn that from storytelling and being within the group (Sokolowski 2015).

Dr. Sokolowski is drawn to narrative; as an artist, she draws comics that tell the story of her personal experiences. As a 'social creature,' she shares these comics with friends and family, who enjoy engaging in her experiences through this interesting format. Along with comics, Dr. Sokolowski paints with watercolor and is drawn to the forms of animals. In response to a recent body of watercolors emphasizing biodiversity across continents called *Animalia*, her 10-year-old niece said, "Ya know, I've never really liked animals, but now that you've drawn them, they're beautiful" (Sokolowski 2015). *That* has power; *that's* personally engaging on an individual level.

In a way that only artists can manage, Handler engaged me personally through his stories as well, vividly expressing his recent experience in Denali, Alaska's permafrost tunnel: "We saw bones of extinct megafauna sticking out of the permafrost. We saw grass 10,000 years old hanging from the ceiling of the tunnel that still is green, that hasn't lost its color because it was frozen. We saw ice wedges that dated back to the Pleistocene—30,000 years ago—that remained frozen that entire time" (Handler 2015). This vivid recollection, so fresh in Handler's mind, came across poetically as he passionately described the tunnel deep below ground. After returning from Alaska so recently, and gracing me with experiences so crisp in his memory, Handler noted he has a lot of work ahead of him to create art from his trip investigating permafrost issues in the United States. The topic of climate change is one Handler is familiar with.

Handler gained national recognition in April of 2015 for his "Canaries in the Coal Mine" sculpture series, receiving the Audubon Award for Art Inspiring Conservation from the National Audubon Society. The award honors an individual who "uses art to communicate the value of nature, interpret conservation challenges, and inspire humanity to protect wildlife" (Buente 2015).

Handler was chosen for his extensive environmental advocacy (an active member of the non-profit, non-partisan organization, *Citizens' Climate Lobby*), his expertise in craftsmanship and sculpture, and, in particular, his “Canaries in the Coal Mine” series of sculptures. The old adage series title refers to the dated practice of coal miners bringing a canary into the mine with them. If the canary died, this was a signal to miners that something was wrong with the air quality. “This is a good working metaphor for what we now face on Earth. With the ever-increasing burning of fossil fuels, we have ‘canaries’ all around us” (Buente 2015). *Golden Toad Reliquary*, from the series, is a 4.5 foot tall sculpture made of Spanish cedar, anodized aluminum, glass and ceramic imagery—ceramics created by artist and wife, Karen Singer (see Figure 4). Handler tells me the golden toad was a tiny, bright gold toad, endemic to the Cloud Forest of Costa Rica, that went extinct in the late 80’s—“the poster child for climate-caused extinction” (Handler 2015). On his website, Handler mentions the “climate change-induced El Niño” that caused an early rainy season (Handler Studio 2015). The synchronicity of the toad’s mating season with the rainy season of the region was vital for egg laying in the ponds, he told me in the interview. “The golden toad had no ponds to lay their eggs; they went extinct in just a year” (Handler 2015). This example is a great one to discuss the artist’s interpretation of science and the scientists’ interpretation of the facts.

While Handler’s intentions are commendable—and perhaps on point—to convey extinction events linked to climate change, many scientists who’ve studied the disappearance of the golden toad and the paleoecology of the Cloud Forest would argue there is no direct correlation between climate change and the toad’s disappearance. In a 2010 article published in the *Proceedings of the National Academy of Sciences of the United States of America* (PNAS), Paleoclimatologist and Dendrochronologist, Dr. Kevin J. Anchukaitis and Paleoclimatologist with special interests in tropical processes and global climate change, Dr. Michael N. Evans, co-authored a report that concluded there is no evidence of an El Niño trend associated with global warming. Climate variability, as observed through stable oxygen isotope measurements from

trees without annual rings in Monteverde, Costa Rica, produced a century of hydroclimate data for the scientists (Anchukaitis and Evans 2010, 5036). Their job was to interpret the data to reveal if the climate variability in Monteverde was greater (leaning toward climate causation) or in line with natural climate variance. Furthering complicating the investigation by adding another variable, Anchukaitis and Evans noted the typically blamed dual causation for the golden toad's extinction: anthropogenic climate change *and* a lethal amphibian disease known as the chytrid fungus (a fungal infection that has spread across countries and continents, killing countless amphibians). Based on climate data and the spread of the chytrid fungus in the region, the authors concluded that the 1986–1987 El Niño event was one of the longest, driest periods in the region in the last 100 years; however, the event was not beyond the range of natural variance and there is no direct link to anthropogenic climate change as the golden toad's killer (Anchukaitis and Evans 2010, 5037-5038). The authors were unsure if the chytrid fungus was present in the area before the 1986 dry spell but offered that after the dry event ended in 1987, the remaining toads would have likely congregated around the few remaining wet microhabitats—a hotbed of fungal activity. The fungus would have then been able to spread through the population quickly, in effect, causing their extinction. In conclusion, the authors suggested the cause of the Monteverde golden toad extinction was a combination of an unusually strong El Niño-forced dryness and the lethality of the chytrid fungus (Anchukaitis and Evans 2010, 5038). They offer no direct link, in this case, to anthropogenic climate change, though, they state, that's not to say humans did not *contribute* in some way.

When the science cannot ultimately point fingers to a causation (and in science you don't "prove," you only "fail to disprove"), then scientists are not usually eager to jump up and point fingers at climate change. Going back to the golden toad example, there is no scientific consensus on climate change causing the extinction; *however*, all this is not to say that using the golden toad as an *icon* of climate change effects and the larger issue isn't a worthy path for the artist.

Handler's series focused on icons. An icon, as mentioned in O'Neill and Nicholson-Cole's research on imagery and public perception of climate change, is an extremely powerful tool of communication. The power of the icon, as exemplified in Handler's "Canaries in the Coal Mine" series, surpasses the need for scientific accuracy. The take-away point is that we are talking about these issues more in-depth *because* of Handler's artistic portrayal of the larger issue of climate change. O'Neill and Nicholson-Cole's research had indicated the iconic imagery pulls people in, although, it had the effect of making people feel helpless at their individual level of action. I think Handler is riding an interesting, and effective, line where the use of an iconic image as a metaphor for irreversible climate change impacts *does* produce personal engagement with climate change issues. Handler creates immense viewer impact by increasing public saliency through metaphorical relationships. His sculptures are aesthetically pleasing, which he points out is critical to viewer engagement (Handler 2015). Pulling viewers in with values of beauty, Handler supplements the pieces with paragraph statements addressing content with climate change concerns. He creates a narrative, infuses emotion and beauty into the piece, and connects the dots between an animal's extinction and human-caused climate change. While the scientific evidence for that *direct* link may not be there, maybe that doesn't matter. The point is, viewers are thinking about climate change and its effects in ways that are personal and meaningful. That is one major role of art in the global climate change movement—the mere fact that the art stirs the conversation and generates discourse—and potentially action.

In considering icons as a tool for individual engagement, I turn to a project Dr. Marston mentioned in her interview during her case study on the Cape Farewell Project—Deirdre Nelson's *Birdyarns* (see Figure 5). Artist Deirdre Nelson developed *Birdyarns* during her Cape Farewell expedition in 2011. *Birdyarns*—a migrating installation of hand-knit Arctic Terns—sparked personal engagement with individuals and has continued to see growing audiences who 'flock' to the beautifully knit birds (Cape Farewell "Sea Change" 2012). Initially, Nelson was working with knitters from across the United Kingdom to respond to changing migration patterns

of seabirds in the Scottish Isles. Knitters used local wool and recycled materials to create a flock of ‘lost’ Arctic Terns, then installed them on a pier and welcomed the lost group with food, music and poetry. The project has since expanded with the help of Nelson’s knitting kits, which can be purchased online. Partnerships with local wool producers have allowed the project to gain exposure and highlight the plight of migratory birds while celebrating local wool and the resourcefulness of artists using recycled materials (Cape Farewell “Sea Change” 2012). Through community engagement, social media, knitting kits and local wool partnerships, Nelson has continued her *Birdyarns* project for several years since the Cape Farewell voyage. The ‘flock’ continues to grow with requests for collaboration from musicians and venues and as more knitting kits and installations pepper the globe. Nelson commented on the Cape Farewell blog: “The birds are gathering new friends as they land in each venue, and it seems that their gentle activism is engaging new audiences both for *Birdyarns* and [for] Cape Farewell in a cultural (and knitted) response to climate change” (Cape Farewell “Sea Change” 2012). This type of art and climate change project—a local project with global applications, an adorable wool knit bird becoming an icon of climate change, and a cultural inclusion project that seeks collaborations—is, what I think, what Dr. Smith had been introducing me to at the start of my research. Art and culture can have a significant role to play in climate change discourse, not necessarily making the issue simpler but making the conversation more challenging and digging much deeper into avenues of engagement, outreach and dialogue.

Birdyarns has been an encouraging piece of evidence to show a relationship between climate change art and increased climate change awareness on a regional and growing scale. The buzz around this project, the offers of collaboration and the purchase orders for knitting kits all point to increased efficacy in raising an individual’s awareness of climate change. The unique and personally engaging aspect of this project is the development of the knitting kit, which can be purchased and completed on an individual level at home. The project then gains personal investment—financially, yes, through the purchase—but also emotionally. People begin to feel

like they are a part of the project, and by extension, have actively engaged in action on the topic of climate change. *That* is a valuable role for art to play in the global climate change movement.

ArtCop21, a collaboration between Cape Farewell and COAL (the Coalition for Art and Sustainable Development), based in the United Kingdom, has been actively creating a global festival—during my writing of this paper—by highlighting projects just like Nelson’s to promote climate awareness and positive change (ARTCOP21 2015). This global cultural movement grew their roster over several months to include 551 art events in 54 countries. From September to December 2015, artists and organizations were asked to submit their art-climate change events, adding to the collective voice of artists addressing climate change. Events included: art installations, plays, exhibitions, concerts, performances, workshops, talks, conferences, family events, screenings, group gatherings and demonstrations. The culminating event to ArtCop21 was the annual United Nations Conference on Climate Change (COP21), held in Paris in December of 2015. Large *and* small events were welcome on this global platform that highlighted arts happenings on an interactive global map of activity on the website. “All these events will highlight the need for governments meeting in Paris to support strong climate action and signal the end of the fossil fuel era – making climate change a people issue, not one to be left solely to the politicians” (ARTCOP21 2015). This is global grassroots action, similar to the 350eARTh project. After exploring ArtCop21, I returned to a comment Dr. Smith made on the role of the artist to address climate change:

You work with artists, not because you think they’ll be great communicators—if that’s what you need, go and hire a PR firm...you work with artists to help you delve into the complexity of a question. It won’t come back simpler, OK? That’s one of the points. Be careful what you wish for because this issue is going to be made more complex, not less, by engaging with artists (Smith 2015).

These words strike the core of what the role of art is in the global climate change movement. Art is a complex and necessary addition to the global discourse and related mitigation actions on climate change. The role of art in addressing climate change doesn’t stop with the artwork, or it doesn’t have to anyway. Dr. Smith continued by saying Cape Farewell had fortunate timing as an

organization and movement in itself: “They hit a sort of rising tide of attention [in the global climate change movement]. They are both a measure and contributor of that rising tide of attention” (Smith 2015). Artist David Buckland founded the Cape Farewell project in 2001 as climate change was becoming a more urgent global topic of discussion. Dr. Smith points out that it is important to understand that climate change is informing the arts already, without a direct invitation from science. Smith asserted that artists are not always “invited” into science circles, yet, he feels Cape Farewell has done a brilliant job at offering an “explicit invitation to the arts, to engage directly with the topic” (Smith 2015). The Cape Farewell project has been able to intersect the arts and science through visible platforms during the contemporary global climate change movement.

Cape Farewell was one organization profiled in-depth by Dr. Marston during her two-year international research study. While they didn’t focus exclusively on art and climate change, Dr. Marston, Dr. Dixon and their team situated the need for art and science collaborations by diagnosing an “institutional compartmentalization” that distanced the arts from the natural sciences. Dr. Marston shared her project report with me, *Art-Science Collaborations, Bodies, and Environments*, which described the range of her research. Instead of segregation, the authors cited a “shared history” of mutual learning and symbiosis as well as a desire for each party to draw upon raw source material that drives the present-day art and science collaboration (2012). Both parties sought to benefit from one another on a personal experiential level as well as with the shared common goal of engaging people in climate change. While I cannot comment here on the specifics of Dr. Marston’s research—due to her team’s pending publications and my limited access to information—Dr. Marston did mention an argument one of their future publications will present, which states: “...what art-science collaborations have helped us to think through is the *embodied* experience of climate change rather than statistics of climate change—the inches that sea level will rise, the amount of degrees the temperature will increase—those kinds of things we know are going to happen” (Marston 2015). Dr. Marston emphasized that the arts bring climate

change to life in an experiential way that graphs and warnings cannot mimic. She further strengthened her team's argument by stating artists help people experience climate change in different ways. They investigated how artists use their bodies to absorb and understand effects of climate change, then how the artists' interpretations were produced for exhibitions to allow the public to gain an understanding of that experience. She's talking about empathy—about a personal, emotional connection to a larger topic through the artist as a filter and medium. Dr. Marston explained this research and her team's findings will be published in the future, but the details of the study were not available at this time (Marston 2015). Dr. Marston and her team focused on the “institutional compartmentalization” that distances the arts from the sciences, which is a relevant topic for another participant in my research—scientist, Dr. Tony Broccoli of Rutgers University, New Jersey.

Dr. Broccoli—Co-Chair of the Rutgers Climate Institute (RCI) whose primary purpose is to build connections between university departments regarding climate change—has taken small steps to include the arts in climate change within the Rutgers University institution. In contrast to the other participants, Dr. Broccoli never used terms like ‘personal’ or ‘storytelling’ to define the role of art to address climate change. When I inquired if RCI had ever collaborated with the arts departments on campus (the nationally acclaimed Mason Gross School of the Arts), he responded by saying they have worked with “different aspects of the arts” on campus (Broccoli 2015). For example, some members of RCI provided content and “maybe some voiceover background type of stuff” to a documentary group on campus (Broccoli 2015). It became clear from my conversation with Dr. Broccoli, and from the content on the RCI website, that RCI has not collaborated with the arts departments within their university in many significant ways—barring one example with the university-based museum, the Zimmerli Art Museum. Mason Gross offers degrees in Dance, Music, Theater, Digital Film, and 7 programs of study in the Visual Arts (Rutgers University 2015). As an alumni of Mason Gross School of the Arts myself, I can state that students of the art school, and perhaps faculty, would be interested in partnering with RCI on

climate change projects. It is unclear to me why RCI has not taken steps to include the arts departments within the university.

Dr. Broccoli did discuss three collaborative art and climate change projects during our interview—the level of collaboration varied from project to project. One project occurred at the George Street Playhouse, a non-profit theatre adjacent to Rutgers University. Dr. Broccoli was invited to be the keynote speaker to introduce the climate change production, *Gabi Goes Green!*, which pits 14-year-old Green Hero, Gabi, against Captain “Climate Change” Carbon (George Street Playhouse 2015). Dr. Broccoli spoke to students in grades 3-8 and their teachers about the science of climate change, and the difference between weather and climate, before classes packed in to watch the play. The Rutgers Climate Institute was one of five groups that “worked” with the George Street Playhouse “to provide valuable research for the project” (George Street Playhouse 2015). It remains unclear exactly how much RCI contributed to the content of the play itself.

Dr. Broccoli further discussed two clear collaborations with the arts: one partnering with the university-based museum and one partnering with the university at large. RCI co-sponsored a climate change art exhibition at the Zimmerli Art Museum to showcase work by climate artist Diane Burko who had traveled to Antarctica and the Arctic several times (coincidentally with Petrovich-Cheney to Svalbard in 2013). Additionally, RCI sponsored campus film screenings of James Balog’s *Extreme Ice Survey* documentary, “Chasing Ice.” This film has been instrumental in helping people to visualize the effects of climate change. Balog has been documenting glacial ice retreat through time-lapse videos and photographs over months and years in several locations around the world (Extreme Ice Survey 2014). The footage is then sped up to produce a fast-paced melting landscape showing glacial changes around the world, calling immediate attention to a direct climate change issue. Dr. Broccoli noted that Balog’s film clearly “reaches people in a way that showing a graph of how much ice has retreated in the last decade doesn’t connect in the same way emotionally” (Broccoli 2015). He unmistakably sees a connection between time-lapse film and viewer engagement. Dr. Broccoli commented that RCI “is conscious of the need to try to

communicate through many different media” (Broccoli 2015). I would argue that these examples are a great start to a more integrated approach to art, culture and climate change, but RCI still has many untapped—and valuable—resources to explore within their university arts departments.

Art can play many roles in the global climate change movement; there is no singular, defining moment for art in this growing, critical, contemporary issue. The important point is that art addressing climate change continues to be made, continues to be heard, and continues to be part of the collective. Handler would appear to agree, as he concluded his interview with me by stating, “This is an incredibly exciting time to be a student because the *need* is so great and so directed and can be come at from so many different angles. It needs to be. We need all these different inputs. This is a great time to be in a place to contribute to changing the world” (Handler 2015). Handler views the role of art in the climate change movement to be an active and necessary voice—one that gains momentum through collective action. What I thought was an opening question to get the conversation going with the research participants ended up conjuring complex, fascinating concepts and insights. “What is art’s role in the global climate change conversation” produced the bulk of my research—much of which is not presented here. Participants were eager to tell their stories, offer up their opinions, and direct me to other people who would be interested in talking. I was showered with more resources than I could handle. I came away with many more questions than I started with about the intersection of art and climate change—and that’s really the point of what Dr. Smith was saying. The conversation gets *richer* and *more* complex when you involve the arts; things don’t get easier—they become more challenging. Environmental artists and arts administrators invested in a climate change program will benefit from this research by understanding the role of art in the global climate change movement is to deepen personal engagement with climate change issues and provide new platforms for deeper reflection and discourse—with or without the intent to catalyze activism.



Figure 3 – Project 350eARTh, Daniel Dancer. “The Elephant in the Room,” November 20, 2010. 3,000 students from Ryan International School: Dimensions unknown. New Delhi, India. Courtesy Daniel Dancer/artforthesky.com.



Figure 4 – Peter Handler. “Golden Toad Reliquary,” 2011. Spanish cedar, anodized aluminum, glass. Ceramic imagery by Karen Singer: 4.5 feet tall. Courtesy the artist.



Figure 5 – Deirdre Nelson. “Birdyarns,” 2012. Ardanish wool, recycled plastic: Dimensions estimated 8” x 4” x 7”. Scottish Isles. Courtesy the artist.

Chapter Two—The Artist’s Fidelity to the Climate Science Data

A looming question I had for the scientists participating in my research was how they felt about artists taking liberty to conceptualize and present climate change information to broader audiences. I wondered whether climate change data could effectively be portrayed in art if an artist was unwilling to budge on an aesthetic point or use of synthetic materials. From the research, it appears some artists keep fidelity to the quantitative climate data by presenting that same information in different ways, as noted by Dr. Marston. But what of artists who take climate data as an input and manifest that information in ways that may be misleading to the physical data? Is an artist’s conceptual ability benefiting the larger climate change movement or hindering the public’s understanding of this serious issue? Similar to my conclusions in the previous chapter citing Handler’s use of the climate change icon, the golden toad, as being beneficial, all of the scientists in this study were in agreement that artists are not bound to the strict fidelity of climate data in the artist’s interpretation of climate change, though, there are consequences to manipulating the science.

Dr. Broccoli considers the acceptable range of the arts maintaining fidelity to science by reflecting on the laws of physics in the Star Trek television series:

As a scientist, if I’m watching some science fiction movie, and they do something that blatantly violates the laws of physics, it takes a little while for me to get over that; but, there are probably some people that don’t know that it violates the laws of physics. There are people that are so put off by the fact that it violates the laws of physics that they may never get over it. I was able to watch Star Trek and accept that they had ways of travelling faster than light, for the purposes of the story, even though, I know from the standpoint of Physics—that at least based on our understanding—there’s no way to do that. But, I think there’s a continuum there that I think, for some people, that’s a barrier for entry, and, for others, they wouldn’t bat an eyelash at it. I guess when it comes to accuracy of the science as depicted in art, there’s always going to be that continuum [that range of responses] (Broccoli 2015).

While Star Trek is clearly science fiction, there are several physics concepts applied throughout the show that attract many scientists as viewers. Some scientists may not be able to get past

scientific misconceptions or errors in the show, disregarding the whole program. This is analogous to the consequences an artist may face with their audience if they stray too far from the scientific facts of climate change. Dr. Broccoli ultimately allowed the violations of the laws of physics in *Star Trek* in order to enjoy the art. He extended the issue by noting the continuum of views on the violations; some scientists will accept the ‘stretching’ (as Dr. Sokolowski puts it), while others will not, and still many more will sit in the grey area in between. This is a really important point. Dr. Broccoli is targeting the very nature of my concerns as an artist with a scientific background aiming to address climate change. How can and how do artists effectively ride the line between art and science while still maintaining integrity in both disciplines?

Dr. Broccoli then turned to a ‘climate fiction’ example to illustrate climate data that’s been stretched too far for most scientists, the 2004 movie, *The Day After Tomorrow*. A rapid freeze-over of New York City and other locations happens in just a few days as a result of the Gulf Stream slowing down. Dr. Broccoli noted there is no way this is going to happen, nor would he agree that the real Gulf Stream circulation issue in the Atlantic Ocean is directly attributable to climate change—research lacks confidence on making that association yet. Dr. Broccoli went on to say as a scientist, there are aspects of the movie that make him cringe a bit, though he acknowledged there may be bits of that movie that make people think a little more about the issue: “The question that I struggle to answer is: ‘If they’re thinking about the issue more, but their concept of the issue is off-base, is that—in the net—a good thing or a bad thing?’ I’m not sure” (Broccoli 2015). Dr. Broccoli’s question is at the core of my concerns with artists maintaining fidelity to the climate data.

While Dr. Broccoli—self-described consumer of literature and art—felt unsure about the consequences of artists manipulating science, Dr. Sokolowski had strong feelings about the role of art to comment on science in general, stating the unadulterated representation of facts is science’s job—the creative expression of information, that’s art’s job.

[Artists] have to deliver this information the way they feel fit, and that's stretching, right? Ok, but as soon as you stretch it too far, it breaks, and then you lose all credibility. And either the art form's tossed out or the science is disbelieved—and you've just ruined it for everyone! [laughter] Maybe that's the wrong way to put it. There's limitations to where you can take it obviously, within the realms of feasibility...is important (Sokolowski 2015).

Dr. Sokolowski believes artists can absolutely manipulate data and information to manifest creative interpretations. She describes the artist's process using scientific information metaphorically, stretching the elastic band that is data. Once the band is stretched too far and snaps, the piece is neither good science nor good art. It is the artist's responsibility to understand the limits of their "elastic band and what the consequences are of snapping that band in the realms of an art-science context.

While Dr. Marston did not offer a personal view on artists maintaining fidelity to scientific information, she did offer an example from her research study on art and science collaborations where artists stayed true to the data, which resulted in a new revelation for the scientists involved. Graphic artists collaborating with the Advanced Visualization Laboratory in Illinois used technology and art to visualize data in new ways. The artists took real data that they inputted into software developed for the project and presented the information—a new way of looking at the same data—back to the scientists. Dr. Marston could not comment on the details of this project, but stated, "These are artists that are very committed to the fidelity of the data; so, they're not trying to produce anything that...would be inconsistent with what the data are telling them" (Marston 2015). That new visualization of the data made those scientists slightly uncomfortable. They were faced with a new way of thinking about their own data. The artists' new visualization of data "made people *rethink* different kinds of creativity and say, 'Oh, I can see how my creativity as a scientist...has kind of boundaries to it. I have to follow a particular kind of logic, [while an] artist's creativity is quite different'" (Marston 2015). Here, we see the need for art and the roles—once again—that art plays when integrated with science. While the scientists' first response to this 'new' information was skepticism, Dr. Marston noted the artists

responded by saying, “Well, look, we are only following the data. We’re giving you back what you gave to us” (Marston 2015). This particular example of maintaining fidelity to quantitative data in an artistic representation proved that new ways of visualizing hard data can be quite powerful and eye opening to the scientific community itself.

An artist’s visualization of real climate data doesn’t necessarily mean the data will become easier to understand, as exemplified by Dr. Marston and as Dr. Smith has offered by stating artists have the ability to deepen and challenge a conversation. Tying together concepts I encountered throughout my interviews, I return back to Dr. Smith’s publication and consider the authors’ progressive thinking. The writing opens by saying, “Climate change is understood to be urgent and important, and at the same time is widely seen as boring, difficult and confusing. It poses a global risk, and yet is highly divisive” (Smith, Tyszczuk and Butler 2014, 6). They go on to say climate change is in need of multiple framings and perspectives. The conversational framing should be malleable, existing in the present with the option to adapt later on. Further, and most in line with ideas on the role of art in my own research, Dr. Smith, Tyszczuk and Butler described traditional climate communications as working toward “getting the message across” when, in fact, what is needed is greater narrative from the arts and humanities:

Although the natural scientists have become increasingly confident in their headline messages it is also clear that it is wholly wrong to frame research into climate change as in any sense ‘finished’. Transformations in the cultural sphere, above all in social and digital media, are having ambiguous, but potentially very constructive, consequences for the ways in which stories about climate change develop and travel. Among other things, these changes encourage more plural and dynamic accounts of our understanding of climate change and the actions that are available to us (2014, 7).

Dr. Smith sees art and cultural playing an integral role in the climate change conversation, not merely contributing to increased communications but being woven into the fabric of the movement. While natural scientists are in vast agreement on the climate data and the appropriate mitigation actions, Dr. Smith sees climate change as a living, breathing discourse that is in no way ‘finished.’

As a scientist, Dr. Smith is informed by academia and research founded in data; but, what is most intriguing to him are the cultural voices of climate change. How are artists, performers and writers responding, and how are communities connecting and contributing? The cultural aspect of climate change makes the movement richer, highly diverse and extremely interesting. Within personal stories, audiences can pull out meaning and connection. People start to ask more questions than perhaps there are answers for, which deepens the global conversation. I'm particularly interested in Dr. Smith's statement in their publication, "Transformations in the cultural sphere...are having *ambiguous*, but potentially constructive, consequences for the ways in which stories about climate change develop and travel" (Smith, Tysczuk and Butler 2014, 7). That ambiguity speaks to my investigation of artists maintaining fidelity to climate science. Here, I believe, Dr. Smith says ambiguity can foster constructive conversations on climate change, which may change the story (the facts) as the dialogue or project travels through media. This ties back to Dr. Smith's idea that conversational framing of climate change should be provisional.

Synthesizing these responses, I assert that artists should maintain their right to conceptualize and manifest climate data as they see fit with the understanding that stretching the data too far may result in a loss of effective climate change engagement. The artist's conceptual ability to manipulate climate data *does* benefit the larger climate change movement. Whether the climate narrative has gone too far off course may not even be as important as the fact that individuals are even engaging in the idea of climate change at all. The responses to the question of artists maintaining fidelity to climate science were fascinating and worth further investigation. Artists' perspectives on this topic would be valuable data to compare to scientists'; further, a larger pool of diverse scientists and artists could contribute more responses to deepen this discussion. With the role of art in the climate change movement addressed and the consequences of straying too far from the science of climate change understood a bit more, I asked research participants to comment on the challenges of funding and impact analysis in their art and climate change projects.

Chapter Three— The Challenges of Funding and Impact Analysis

When my research took an immediate turn that centered on the larger discussions of the role of art in the global climate change movement and the question of artists maintaining fidelity to the quantitative climate data, I put my other key research questions on the challenges of funding and impact analysis on the backburner. While these secondary issues are extremely relevant, and I collected data from participants on both funding and impact, the wealth of responses and avenues of inquiry became beyond the scope of this paper. It is exciting, quite honestly, to have opened this Pandora's box of responses and references for further research on more specific art and climate change program issues. Funding for art and climate change projects and evaluating the realities of impact studies would both be fruitful research areas that warrant their own studies and publications. I will give a brief overview of my initial findings regarding the funding sources for art and climate change projects and the challenges of impact analysis.

Initial responses to funding for art and climate change projects yielded positive results for artists, scientists and the field of arts administration. Fundraising efforts described by participants included artists personally fundraising through Kickstarter campaigns and scientists looking to government funds for research and programs. Initial research into art and climate change collaborative organizations yielded several funders for Cape Farewell including government, corporate, public and private support. Petrovich-Cheney discussed challenges and success with crowdfunding for her Arctic Circle residency; Dr. Smith bartered the gain of Arctic media assets to create an interdisciplinary textbook for his university in return for the university funding part of his Cape Farewell expedition; Cattrell was funded by Creative Scotland for her portion of a Cape Farewell voyage; Dr. Marston's two-year collaborative project was funded by the National Science Foundation (United States) and the Arts & Humanities Research Council (United

Kingdom). Each participant discussed several benefits and challenges of funding. Dr. Marston went on to tell me her investigation into art and science collaborations stemmed from the funding issue of writing a proposal that satisfied both art and science criteria. She noted that the proposal for funding took several tries; they found there was a lot of funding available and research into art and science collaborations hadn't been very substantial in the literature. The funders were excited, thrilled even, by Dr. Marston and her team's proposal, but didn't initially offer funding. "They just kind of went, 'Whoa. We don't even really understand what this is. We need you to convince us that your methodology is going to be effective.' So, we went back and built in more stuff into the methodology" (Marston 2015). Dr. Marston did not comment further on the methodology but instead commented on the need for further studies into funding and impact, stating that if I were eventually looking to write a dissertation, I "would be a shoe-in if you looked at that kind of art [art addressing climate change outside of the gallery or museum environment]...the way it draws in audiences—that art for art's sake doesn't" (Marston 2015). Dr. Marston believes this is a really "provocative" question, especially since places like the National Science Foundation really want that data on public impact in return for funding. Dr. Marston's response intersecting funding with the impact of art and science is a fertile topic that warrants future study.

Petrovich-Cheney discussed her personal experience crowdfunding through a Kickstarter campaign online to raise \$8,000 to attend an Arctic Circle residency. Individual donors, no matter what level of donation, felt invested in her project. She noted friends, neighbors, community members and the art community at large—including the National Art Education Association—contributed at various levels and most expressed their investment with Petrovich-Cheney as being more than just funding. "It was an 'emotional investment'," she stated (Petrovich-Cheney 2015). The artist described a new type of community that developed around her trip, which took a year to gather funds and prepare for the excursion. She was active on social media and set up a reward system (required by Kickstarter campaigns), sending donors

postcards, photos and regular updates during the trip. As an arts educator, her experiences and mementos were shared with her students and with the local newspapers, “‘Art Teacher Goes to the Arctic,’” she recalled (Petrovich-Cheney 2015). She noted that’s what the goal of the program is about—to bring awareness to people. Petrovich-Cheney went on to create art from the abundant debris she collected on her hikes in the Arctic Circle. The garbage pieces were repurposed in her series, *What Are the Net Worth of Our Global Assets?* (see Figure 6). Petrovich-Cheney has been in the newspapers, in social media and on television several times due to her art (inclusive of her more well known works reclaiming wood from Hurricane Sandy in 2012 to create wooden quilts). She recently held a panel discussion on art and climate change and is exhibiting her Arctic Circle pieces at the Noyes Museum of Art at Stockton University in New Jersey. These types of exposure beg the question of impact on the random public who view her work. Again, I’m left to wonder how measurable attitudes and behavior change are after viewing climate change art in an exhibition setting. As seen by Petrovich-Cheney’s anecdotal evidence with Kickstarter, funding and impact are not dichotomous and should both be considered in future studies relating to art and climate change projects.

The question of climate change art having a measurable impact on audiences additionally yielded challenging responses and calls for further research. Dr. Smith has his hand in many different climate change cookie jars and actively publishes, coordinates collaborative events, teaches, talks to artists, and continues to find new platforms for engagement. He’s been involved in many projects over the years that intersect environment, communications, culture, public engagement and politics with other collaborators of similar and dissimilar fields. For example, he and his wife, Renata Tyszcuk, partnered with the New Economics Foundation (a United Kingdom registered charity—a “think-and-do tank”) and the University of Sheffield to create the online resource, the *ATLAS of Interdependence*. ATLAS creates a platform for fields to converge and consider ethical and practical issues and solutions to globalization and environmental changes (ATLAS 2015). ATLAS does not pretend to be a comprehensive resource but, rather, invites

people to contribute resources to the ATLAS and be part of the conversation. “Just to wear an Interdependence t-shirt does not solve the problem,” Dr. Smith noted. The work Dr. Smith and his colleagues do, in this project and others he spoke of, involves academia and publications but also invites participation from online contributors and from individuals at public events. Dr. Smith has actively talked to many researchers, artists, journalists, students and others. Perhaps if impact is so difficult to measure, climate change artists should do what Dr. Smith does and just continue to talk about the issue, find new platforms of engagement, collaborate on many levels, and just keep moving forward and branching out.

Dr. Sokolowski took a different approach to my impact analysis question by offering her thoughts on how to target audiences more effectively, considering three groups: politicians, big business and the general public. She stated the impact of art on climate change will be “enormous, if you target your audiences correctly” (Sokolowski 2015). Dr. Sokolowski considers three separate audiences:

- 1) Politicians – You just have to treat it as a security issue.
- 2) Big Business – Address the economic issues.
- 3) General Public – You target their heart. You just make it a moral issue. People really respond to that.

(Sokolowski 2015)

She concluded by noting it’s more of a marketing issue than anything else—a very interesting take on the idea of impact. The range of responses to art’s impact from both artists and scientists suggest that impact is important, maybe not measurable, and maybe that’s OK.

When I prompted Dr. Broccoli to consider RCI’s interdisciplinary impact on faculty who talk to students, he taught me about *force multipliers*. He described this as something you can do that has a disproportionate effect because of something that makes the effect stronger, in this case, an action that dramatically increases the effectiveness of an idea:

...when we're giving a guest lecture on climate change to a group of 250 students in an introductory level environmental science class, we don't know who from that group is going to be a Congressional staffer in the future, a United States Senator or a CEO of an important company. And, in that sense, that multiplying effect, if you can communicate to 250 students at once, the chances are you are communicating to people who are going to be influential in the future (Dr. Broccoli 2015).

The force multiplier effect is a valid hope for climate change engagement, and one that, I think, is a vital part of the global climate change movement.

Collectively, responses on funding and impact analysis have yielded valuable data to be explored in future research. Particularly, future research including Dr. Sokolowski's take on target audiences coupled with strategic planning could supplement this publication in terms of artists and arts administrators creating engaging and impactful art and climate change programs. While funding appears to be on the rise for art and climate change programs, I offer that the investigation of true impact and direct correlation between a work of art and someone's increased engagement with climate change is extremely difficult, if not impossible, to measure with certainty. Howell's study in the literature review noted the same individual over the course of one year changed their stated origins for feeling a certain way about climate change. Memories become foggy, and, more importantly, there are innumerable factors contributing to an individual's understanding of the complex topic of climate change. Perhaps the connection is too broad to warrant significant impact analysis; however, I believe those obstacles should not deter further research into some forms of effective impact studies. Extensive qualitative interviews and surveys could yield important information and connections that have yet to be drawn. For all of these reasons, I have not included additional data on the participants' responses to impact studies on climate change art. I recommend a thorough investigation on both topics of funding and impact studies related to art and climate change.



Figure 6 – Laura Petrovich-Cheney. “What are the net worth of our global assets?,” 2015. Debris found along the shores of Svalbard, Norway during Arctic Circle Residency in October 2013. Noyes Museum of Art, Stockton University, New Jersey. Courtesy the artist.

Conclusion

The contemporary climate change movement requires the integration of artists to respond to the challenges of climate change not merely as buffers between the public and the hard data but to incite a richer and more complex conversation through the cumulative impact of all art that addresses climate change. The findings presented in this publication suggest that art, artists and arts administrators have significant roles to play. The role of art in the global climate change movement is to deepen personal engagement with climate change issues and provide new platforms for deeper reflection and discourse—with or without the intent to catalyze activism. While inciting a call to action is not the primary purpose of every art and climate change project, subsequent pro-environmental behavior from an individual is a welcome result. Though all research participants contributed to my analyses presented in this publication, I must acknowledge the important contributions of scientist, Dr. Smith, and artist, Peter Handler, in my creation of a thesis statement. Progressive ideas presented by both Dr. Smith and Handler ignited true epiphanies for me as an artist, environmental activist and arts administrator. I offer a great deal of thanks to all participants in my research study and offer the most gratitude to Dr. Smith and Handler for their enlightening interviews. The epicenter of my research became the role of art in the global contemporary climate change movement. Secondly, the issue of artists maintaining fidelity to the climate data became an additional focus. Preliminary results regarding fidelity revealed that scientists agree artists should maintain their rights to manipulate scientific data, with the understanding that stretching the data too far from the source may have significant consequences on audience understanding and efficacy. Based on the results of this study, I offer recommendations in this concluding section for the field of arts administration and for artists interested in responding to climate change. I come away from this research with more questions

than answers; however, I now have a much greater understanding of the need for art and the complex roles that art plays in the global climate change movement.

Dr. Smith played a vital role in the evolution of this paper, asserting early on in my research that when you involve artists in the conversation, things don't get easier—they become more challenging. Dr. Smith is a renowned researcher who fully believes in weaving the arts into the cultural fabric of the ongoing revolution of the global climate change movement—along with politics, economics, social science issues, geography and mass media. He broke open my research assumptions and direction by stating: “You work with artists, not because you think they'll be great communicators...you work with artists to help you delve into the complexity of a question. It won't come back simpler. Be careful what you wish for because this issue is going to be made more complex, not less, by engaging with artists” (Smith 2015). I've come back to this statement time and again during my research. I had anticipated at the onset of this study that scientists in particular would direct me toward integrating the arts into the climate change discussion as a means for creative communications—to make the climate data easier to swallow for audiences. Dr. Smith stated the opposite. An artist's job isn't to make the conversation simpler—although Cattrell, Petrovich-Cheney and Dr. Marston commented on art's ability to do just that at times. Dr. Smith argued that artists stir up *more* intense conversations, and scientists are not necessarily looking to the arts as a method of clearer communications. Artists present unique capabilities to absorb and integrate information to produce potentially powerful manifestations of climate change issues. Artists in this study presented their roles as liaisons to personal engagement through storytelling and experiential emotion. Further, artists present an avenue for personal engagement on a local level—this is important for environmental artists to understand as they add to the growing catalog of art addressing climate change.

With more artists contributing to the climate change movement, the cumulative impact of all art that addresses climate change is more powerful than a single climate change art project. Handler emphasized the power of the collective when he talked about activating behavior change

in people. He felt the individual had less power than the collective, which forced me to consider the power of the sum of art and climate change projects. I had researched—and participated in—both grandiose and minuscule art and climate change projects over the years. As an environmental artist myself, I have struggled with developing the most effective and efficient art and climate change project—unsure of how effective massive programs really were and giving myself a hard time when my smaller attempts to engage climate change in my art didn't strike intense dialogue in viewers. From this research, I've concluded that the cumulative impact of the entire growing catalog of climate change art during this important contemporary movement holds more power than even the largest climate change art program. The question of fidelity to climate data became clearer as my understanding of the role of art came into focus.

The question of an artist maintaining fidelity to the climate data sparked intense opinions and valuable areas for further research but ultimately revealed that artists *should* maintain their rights to manifest climate data as they see fit as long as they understand the consequences. The opinions expressed by the research participants—though not all participants discussed this issue—pointed to acceptance of artists manipulating climate change data but only to a certain degree. Dr. Sokolowski brought a unique set of experiences and insights to this research, as a Toxicologist as well as an exhibiting artist. She offered a useful analogy, exclaiming that we could consider climate data to be like an elastic band. Artists are free to stretch the band, playing with climate data and potentially altering the understanding of climate change for the viewer, but once the elastic band is stretched too far—it snaps, "...and the work is neither good science nor good art" (Sokolowski 2015). It is the artist's responsibility to understand the capacities of their elastic band and what the consequences are of snapping that elastic when it comes to engaging an individual in climate change awareness and action. In turn, Dr. Broccoli stated that he struggled with the idea that if people are thinking about climate change *more* because of the art but their understanding of it is off base, overall, is that a good thing or a bad thing? At this point in time, he's not sure. Dr. Smith's publication, *Culture and Climate Change: Narratives*, implied that

ambiguity through narrative has potentially constructive consequences for the climate change movement as the stories travel through communities and the media. Smith insisted in his publication that the conversational framing of climate change should be provisional—existing in the present with the option to adapt later on. Malleability is a language of the arts; there can be multiple interpretations of an artwork and incalculable personal connections to art. Further, the interpretation of art can change over time and within different contexts—a provisional value of art. Synthesizing these responses, I claim that the artist’s conceptual ability to manipulate climate data *does* benefit the larger climate change movement. Whether the climate narrative has gone too far off course from the original data may not even be as important as the fact that individuals are even engaging in the idea of climate change at all. It is my hope that these findings will aid environmental artists and arts administrators as they consider their contributions to the climate change movement through the arts.

Arts administrators can play a keystone role in developing deeper projects and networking those results with artists, scientists, publics and other collaborators. As part of the global climate change movement, it will be vital for at least some of these art and climate change projects to develop strategic plans and experiment with audience impact studies. Should the arts continue to add to the collective catalog of projects and encouraging deeper discourse, or should we push collectively into individual behavior, corporate and public policy change? While it’s clear there are challenges with quantifying impact on attitude and behavior change, future approaches should consider continuation of art and climate change projects while refining projects to include strategic planning, objectives and methods of assessment.

It’s clear the literature is calling for greater impact assessment, and arts administrators are in a prime position to develop projects with artists and scientists and to research and publish reports on art and climate change projects. I would be more interested to read about the barriers and pitfalls of a project than a seemingly successful project. Clearly, not every art and climate change project needs to incorporate dense logic models, but I think it will be important for at least

some projects—ones that are funded or run by small and large non-profits—to contribute to the research.

Project 350eARTh targeted global policymakers at the annual United Nations Conference on Climate Change and exemplified great potential to gain public and policymaker data through interviews and post-surveys to assess impact; yet, I could not find data to support any such activities after the event. This was a missed opportunity to contribute real data to the field of art and climate change. Further, I, nor anyone I've spoken to about the project, had ever heard of it. There appears to be missed opportunity on several levels in this project; these are issues that should be addressed in a proper logic model. I would recommend greater planning for at least some of these art and climate change projects moving forward.

I have come to understand that art and climate change projects are challenging to evaluate in terms of direct impact on viewers; however, I do think the cumulative impact of all art that addresses climate change is a powerful start to this aspect of the global movement. Like the pace of climate change itself, the global climate change movement is a slower ongoing revolution of thought, discourse, gatherings, adaptation and evolution. Art and climate change projects have room to experiment and grow in their methodology. It should be stressed that a link to *personal engagement* has been made in this research and not necessarily any links to *personal action* to mitigate the effects of climate change. With that understanding, artists and arts organizations—like large non-profits, arts foundations, art schools, museums, galleries, small non-profits, community art centers, artist collectives, and unofficial groups—have several opportunities: 1) to engage in art and climate change programming to increase a viewer's engagement with climate change issues, and 2) to further art and climate change goals by creating a call to action through specifically defined recommendations for action and mitigation. Because increased awareness does not always lead to a change in behavior, organizations will have different approaches to their strategic planning.

Actions and deliverables will differ based on what type of group is engaging in an art and climate change project. The Robert Rauschenberg Foundation maintains a central focus on climate change, as per the vision and passion of founder Robert Rauschenberg. From grants that fund creativity to inspire sustainable solutions to the *Rising Waters Confab Residency* program that brings international minds together “to spark new thinking and to influence civic will toward finding and spreading solutions to the rising waters of climate change,” this foundation is actively engaging in larger *actions* on climate change (Robert Rauschenberg Foundation 2016).

Conversely, a smaller grassroots project like Deirdre Nelson’s *Birdyarns* began as an output of a Cape Farewell expedition but has maintained its grassroots integrity and reach through small collaborations with musicians, cafes, festivals, galleries and at-home knitters. Nelson’s project is an ideal model for arts administrators to analyze and emulate. Spinoff projects based on Nelson’s participatory model—inclusive of the missing evaluation methods—would yield valuable data for the field of arts administration and for the growing catalog of art and climate change projects.

Taking a closer look at the potential of art schools to engage in the global climate change movement—as implied earlier in the research on the Rutgers Climate Institute—arts administrators and faculty within academia have influential power on their art students. Though art and climate change doesn’t necessarily have to be a forced topic on the students, engaging students in art and social action projects from start to finish as a professional artist and a collaborator would be greatly beneficial. Young artists are not always educated on professional collaborations, strategic project planning, and grant processes. Academic arts administrators are in a unique position to make policy changes at the departmental level that require faculty to teach young artists about partnerships, grant writing, project development, audience engagement, outreach and evaluation. There is a misconception that these are arts administrator’s tasks only, but that type of thinking should begin to shift at the collegiate level to offer young artists a leg up in funding and future opportunities. Based on the literature and the primary research, funding is on the rise for art and climate change programs, which is good news for artists and arts

organizations. Collaborations with scientific fields could also widen funding opportunities for specific art and climate change projects.

Perhaps one answer to increase outreach outcomes and strengthen quantitative impact data from art and climate change projects is through a greater call to action from the field of arts administration. Arts organizations can assist artists in creating a call to action on climate change through the use of their press contacts, website, social media and new technologies. Art organizations generally have a network of contacts that can help spread a message to the larger public. An organization's outreach platforms can be used to spark action on the local, state and federal level by inviting the public to write letters to their legislators either through online petitions or direct mail. I've personally experimented with this technique by using my artist postcard for a climate change art installation to give simple instructions to people on how to contact their legislators. From over a decade of environmental advocacy, I offer that contacting one's legislators can feel daunting or overwhelming. People are often afraid that they don't know enough about an issue before writing to their legislator or calling their office—I felt the same, despite my Bachelors degree in Ecology. After speaking with several Executive Directors of art and environmental organizations over the years—and having been a citizen activist for many years now—I understand that most often you don't speak to your legislators directly. Your concerns are filtered through your legislator's staff members; however, it must be stated that even a handful of phone calls (or a slew of direct mail or emails) can generate a clear collective message to an elected official that people are engaged in an issue and will hold the elected official accountable for their actions. Recently, I spoke at a public hearing to have my comments on public record regarding a controversial liquefied natural gas port proposed 25 miles from my home, in the waters between New York and New Jersey. Just one week after public hearings, and years after several enigmatic corporate proposals and inconclusive environmental impact statements, New York Governor Andrew Cuomo vetoed the proposal—stopping the dangerous project in its tracks. Grassroots lobbying—and years of dedicated individual action from

thousands of concerned citizens and groups—made a real change. As an artist and environmentalist, I was able to bring an artistic perspective and several art projects to these advocacy and outreach efforts.

Art and environment collaborations have potentially powerful impacts within the grassroots level of advocacy. I recommend that artists and arts organizations expand their parameters of what an art and climate project can look like. As Dr. Smith noted, the final artwork shouldn't be the capstone to art's contribution to the global climate change movement. The conversation is only beginning with the final artwork. I recommend art organizations assist artists in projecting their message farther by creating a call to action and providing viewers with step-by-step guidance in local advocacy to increase the role and the impact of art in the climate change movement.

The role of art in the evolving global climate change movement is valid, necessary and expanding. I came away from this research with more questions than answers, and that proves the point of art's role in the climate change movement—the conversation only gets *richer* and *more* complex when you involve artists.

Appendix: Interview Questions

Main Interview questions asked of all participants:

- 1) What is art's role in the global climate change conversation?
- 2) Do you believe art can have a measurable impact on addressing climate change?
- 3) Can you describe the art and climate change collaborations you have been involved in?

Framing Questions asked of some participants as the interview process progressed:

- 1) What is your opinion on an artist's use of climate change data and their fidelity to that data?
- 2) Can you tell me how your art and climate change project was funded?

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