Studies on the Cultures and Politics of Environmental Knowledge

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Large scale environmental changes pose significant problems for contemporary societies. The ways in which these problems are given meaning by actors responding to changing conditions is the primary object of analysis in the three articles of this dissertation. They do so by exploring how environmental knowledge is constructed and framed through socially relevant categories such as notions of expertise, science, risk, and resilience. The first article analyzes how an institution with authority over scientific knowledge—the Carnegie Natural History Museum—engages with narratives of the Anthropocene. The Carnegie Museum uses this contested concept to re-imagine the bases for scientific authority in relation to social problems, highlighting how articulations of environmental changes may engender new relationships between scientific and non-scientific communities. The second article explores the role of expertise and expert-public interactions in framing and responding to the problem of sea-level rise in Miami. Miami's Sea Level Rise Committee becomes a primary setting in which the problem is articulated and acted on. As the committee's formation relies on notions of expertise to give validity and authority to claims about the problem, (re)constructing and negotiating the rules and norms of expertise becomes a strategy for communities with divergent sensibilities of the problem to re-frame how and why sea-level rise is a problem. The third article illustrates how climate adaptation ideas and strategies travel from Rotterdam to Miami, highlighting the importance of local experiences and meanings in how the paradigm of resilience is operationalized. As the Dutch come to be seen as the global leader in resilience regarding water-related climate risks, their locally-inspired sensibilities of resilience as

an adaptive strategy go on to influence Miami's own implementations of resilience, though contextualized in ways that are specific to Miami's context. Collectively, the three articles emphasize the importance of local contexts in how environmental problems are given meaning and how this meaning-making relies on socially constructed notions of authority over knowledge.

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Preface

Thank you first and foremost to my advisor, Waverly Duck, who offered immense support and encouragement throughout the research and writing processes of the dissertation. Thank you as well to the rest of the committee, Suzanne Staggenborg, Mark Paterson, and Gregor Thum, who all helped at different stages of the dissertation process. Further thanks go to the journals *Science as Culture* and *Studies in Symbolic Interaction* for allowing articles previously published in their forums to be reprinted as part of this dissertation.[1]

[1] The articles have been modified for formatting and stylistic requirements specific to the dissertation. No substantive changes have been made.

1.0 Introduction

The three articles in this dissertation stem from two theoretically linked but empirically independent research lines based on fieldwork between 2015-2021. The first focuses on the Carnegie Natural History Museum's use of the Anthropocene in their museum, and the second on Miami and Rotterdam's responses to sea level rise. While they cover disparate empirical topics, the shared theoretical approach helps contribute to our understanding of cultures and politics of environmental knowledge, building on literatures from the sociology of knowledge and sense-making. Each piece offers arguments on how socio-environmental knowledge is constructed and utilized in response to environmental problems. In particular, they explore different aspects relating to authoritative environmental knowledge. They do so by illustrating how relevant categories of meaning, such as risk and expertise, are socially constructed and operationalized in ways which facilitate responses to environmental change.

The Carnegie piece looks at how museum actors make sense of a novel concept in natural history—the Anthropocene—as a discursive tool to bring political questions explicitly into scientific representation. The trust building piece looks at the ways that the use of expert institutions, often seen as gatekeeping institutions which de-politicize environmental decision-making processes, may in some instances serve to politicize environmental problems. The traveling ideas piece looks at how the implementation of the use of the resilience paradigm in climate adaptation is shaped both by local sensibilities as well as the sensibilities of communities who are accredited with successful implementations of similar ideas.

Even with the variety in empirical focus, the articles each take up issues relating to a basic set of questions: how are claims about socio-environmental relations recognized as credible, and

how do actors maintain and leverage their authority over environmental knowledge in discourse and practice? The separate articles address this question by exploring questions such as: Why are some ideas taken up rather than others? What does it mean to be able to claim expertise over a particular body of knowledge? How do actors give meaning to ambiguous concepts in ways that are relevant for their day-to-day lives?

These questions are particularly relevant and worthy of sociological inquiry given the contemporary nature and relevance of environmental change. Global climate change is widely recognized as one of the most pressing problems of the 21st Century, with impacts already being felt in many places across the globe. Changing temperatures and precipitation levels mean that many communities have begun to, or will soon, confront environmental changes that have direct impact on their livelihoods. Depending on the location, communities are or will experience an increase in the risk of droughts, heavier seasonal flooding, and disasters such as wildfires and hurricanes. At the most extreme, communities will be required to uproot their lives and migrate in search of better conditions—either due to sea level rise inundating their homes or because traditional agricultural land becomes untenable. To give a prominent example of the changes already being made, Indonesia has begun the process of relocating its capital from Jakarta to Kalimantan due to the threat of sea level rise.

Perhaps an even larger environmental change is represented by the Anthropocene, a concept which describes the heritable human impact on Earth's systems—including climate change but extending to ocean acidification, biodiversity loss, and sedimentary transformation. While the adoption of the Anthropocene as a formally recognized geological epoch is subject to continued debate, the discursive use of the Anthropocene highlights the degree to which human activity has and continues to fundamentally alter environmental conditions.

While these changes are broad in scale, their impacts take place as concrete problems for particular locales and communities. As such, the social problem of environmental change must be considered from global, national, regional, and local perspectives—a global problem which is shaped by local sense-making and framing of particular risks and problems. This collection of theoretically linked pieces illustrates how particular communities—often communities with a degree of expertise or authority in the realm of environmental science or policy-making—make sense of these large-scale problems and how they imagine plausible pathways forward. This research fits into a broader set of literature which examines local responses to environmental changes. Much of this research aims to understand how communities cope with these changes—from immediate natural disasters such as floods or long-term changes such as climate change.

Given the scale and pervasiveness of environmental changes, many social scientists have called for new imaginations of socio-environmental relations which may guide our behavior in innovative ways that break from a history of treating the environment as a stable and infinite resource. Taking this call seriously, much of the motivation behind this research is to examine if, when, and how new ideas and imaginations of socio-environmental relations take shape. As such, the articles offer a variety of insights into the ways that socio-environmental problems may or may not be re-imagined by paying attention to sense-making processes. In particular, the articles explore how socially constructed notions of expertise and authoritative knowledge shape the re-imagining of socio-environmental problems. The focus on sense-making processes includes the cultural and political contexts of knowledge-making and the ways that knowledge is applied through concrete practices. Cultural contexts include how communities interact with their environments in their day-to-day lives as well as how environmental problems are given locally contextualized meaning according to their framing and in relation to other sets of beliefs and

values. Political contexts include power structures, including but not limited to economic capital and interests, as well as broader political discourses in which environmental problems are positioned. This helps shed light on how new ideas and practices may emerge.

It is important to understand local sense-making of environmental changes and problems because it is at this scale where environmental changes take immediate impact and where responses to environmental changes take shape. Of course, there are global dimensions, too, both in impact and response. Climate change will impact global migration and settlement patterns, lead to new conflicts over natural resources, and shape economic activities in still unpredictable ways. International institutions like the United Nations and World Bank, as well as transnational coalitions and agreements such as Paris or COP26, continue to set goals and parameters for taking action in response to climate change. However, it is at the local and regional scale of communities, cities, and networks of institutions where possible actions must be contextualized and implemented. Further, it is at this scale where we can best understand how environmental changes are given meaning in ways that orient actors' responses. This builds on the idea that the lived and built environment inform sense-making of environmental changes. The ways in which communities give meaning to environmental problems is contingent on the particular hazard(s) in a given location. For instance, wildfires in Spain or California, sea-level rise in Miami or Rotterdam, or drought in South Africa or Australia carry regionally-relevant implications due to the ways that the risk of these conditions threaten daily life. Wildfires threaten immediate harm and destruction, sea-level rise poses both short- and long-term problems for infrastructure and the ability to stay put, and droughts may weaken the ability to rely on traditional sources of economic production, namely agriculture. In addition to the environmental hazard in question, the built

environment informs sense-making given the prominent ways that infrastructural and technological adaptations shape the vulnerability of communities.

The three articles share a theoretical stance in their approach to understand these local sense-making processes. This approach draws largely from tenets of symbolic interaction, as it seeks to understand how we think about and give meaning to the environment, carrying the assumption that those sensibilities shape action and behavior. In particular, it builds on cultural cognitive sociology which aims to understand how collectively constructed categories of meaning are (re)produced in society and how they guide behavior. One main theme addressed in the articles is the use of social institutions—such as the Carnegie Museum, municipal Resilience Offices, and Miami's Sea Level Rise Committee—in operationalizing and (re)producing categories of meaning in relation to environmental problems. The articles offer insights into how the association of these institutions with authoritative knowledge shapes both how actors acting within the institutions make sense of problems and possible solutions as well as how they view those institutions as channels to imagine new socio-environmental relations. Often, this requires relevant actors to define and set boundaries to the categories used in giving meaning to environmental changes. At the Carnegie Museum, museum staff see their institution as an avenue of operationalizing the Anthropocene in ways that promote new modes of action and relations between scientific and other communities. The article answers the question of how particular forms of environmental governance are implied and motivated by museum actors' sensibilities and the museum's representations of a concept which articulates global environmental challenges, shedding light on our understand of risk and disaster more broadly. In a similar vein, Miamians come to use the Sea Level Rise Committee as an institution where the meaning of climate change and its associated challenges may be negotiated. Finally, the article on traveling ideas explores how the paradigm of

resilience is used by local communities as a category for interpreting environmental problems, and as such the boundaries and definition of resilience becomes a focal point in organizing responses to the challenges of climate change.

A second and related theme relates to whose sensibilities shape broader discourse and action. The articles look at how different groups' sensibilities of environmental change are prioritized or marginalized. Another way of framing this issue is by asking how particular knowledges come to be accepted as authoritative within a given setting or domain. While the article on the Carnegie Museum does not explicitly engage with different groups' competing or alternative sensibilities, it does offer an analysis of how the rules of authoritative knowledge may be re-written or re-imagined. Museum actors use the Anthropocene as a discursive tool to re-base scientific legitimacy in ways that actively promote a leadership role for the scientific community in explicitly political struggles and debates. The other two articles look more concretely at the ways particular communities instill their sensibilities into environmental policies and actions. The trust building piece examines how two competing views of the problem of sea level rise develop in Miami, and how these two views are negotiated through the Sea Level Rise Committee. In particular, it shows how claims of expertise become a primary parameter for groups' sensibilities becoming prevalent and represented in formal decision-making processes. The third article takes a more global look at this question, examining how Dutch sensibilities of resilience and sea level rise influence Miami's actions due to both symbolic and material processes which place the Dutch as the global leaders in climate adaptation. As the Dutch come to be viewed as those who should be replicated, their own ways of giving meaning to the paradigm of resilience travel to Miami in ways that go beyond the replication of policy tools and blueprints.

It is from this perspective that the work in this dissertation approaches two key concepts—the Anthropocene and resilience—which have become the subject of extensive analysis within the social sciences in recent years. Each of these concepts can often be something of a black-box, articulated and interpreted in a variety of ways dependent on one's perspective and contexts. Because of this, it is worth briefly discussing key ways in which social scientists have theorized and debated the Anthropocene and resilience in order to contextualize how the papers that follow engage with these concepts.

Much of the work which grapples with the Anthropocene attempts to use the emergence of the concept to better understand contemporary political and cultural conditions. Early work, particularly in geological literature, articulated the Anthropocene as a transformational event which marks a break from past human-ecological relations and signifies the makings of a new, uncertain world (Bonneuil and Fressoz 2013; Steffen et al. 2011; Davies 2016). The focus of this literature is on the radical changes brought about by an unprecedented human impact on the Earth. The Anthropocene is often framed as a disaster or a shock to the entire global system (Hamilton 2013; Stiegler 2018), suggesting a monolithic rupture and emergence of a new reality which calls for new forms of governance and environmental policy (Chakrabarty 2009; Zalasiewicz et al. 2010; Dillet 2018).

Recent literature stemming largely from the critical social sciences has problematized this conceptualization, suggesting that this narrative misses on a few key points. Notably, critics point out the anthropocentrism of this view, which grants too much agency and power of humans over the future of the Earth (Crist 2013; Clark and Yusoff 2017; Latour 2017; Chandler 2018). Rather than marking an essential shift and interpreting humans as having a newfound power over Earth systems, these scholars emphasize that the Anthropocene is merely a continuation of what has

always been an entanglement of human and non-human nature with limited human force over Earth systems (Moore 2015; Colebrook 2017; McQuillan 2017; Protevi 2018). As such, the promise of the Anthropocene as a concept is best thought of as an opportunity to re-imagine the relationships between humans and their environments, and in particular how we understand the possibilities as well as the limits of human force over the Earth (Danowski and Viveiros de Castro 2017; Saldanha 2018). Further, scholars have called into question the monolithic description of the Anthropocene, pointing out the imbalanced ways in which its associated environmental changes have been caused as well as how they are and will be experienced (Chandler 2013; Malm and Hornborg 2014; Davies 2016). In this literature, writers explain that Western and wealthy societies carry the most responsibilities for the environmental changes in question while managing to avoid the largest costs of their consequences which are felt most intensely by disempowered and marginalized communities (Kunnas 2012; Moore 2016; Latour 2017; Saldanha 2018). As such, it is argued that we should avoid conceptualizing the Anthropocene as a unifying story told about humanity's immense capacity which prompts universal political governance of the environment. Rather, we should recognize in the Anthropocene the significant uncertainty in our understanding of environmental challenges and focus on reflexive, piecemeal, and context-dependent responses (Evans and Reid 2014; Tonder 2017; O'Brien 2017; Wakefield 2017).

That our conceptualizations and articulations of the Anthropocene motivate particular responses to environmental changes largely frames how the first article in this dissertation contends with this malleable concept. These responses may be characterized by political governance strategies as well as re-conceptualizations of socio-environmental relations in terms of human agency (Chernilo 2017; Colebrook 2016). This approach to understanding the Anthropocene contributes to literature which makes sense of the Anthropocene as a story telling

device to understand its implications (Kunnas 2017; Hamilton 2017; Chakrabarty 2017; Thomas 2018; Simon 2020). The following article builds on this approach, yet contributes to the discussion in a different way by engaging with the Anthropocene as a concept articulated by social actors in the everyday context of a museum space. This moves away from contending with Anthropocene stories and narratives from the standpoint of its articulation in Earth and social science literatures, focusing on its practical application in a real-world setting. As will be shown, this is particularly helpful in identifying the ways in which the Anthropocene motivates new imaginations of socio-environmental relations as well as political environmental governance.

A parallel account can be given with respect to resilience. Like the Anthropocene, the concept has been subject to continuous debate regarding its theoretical significance within the social sciences. Resilience has been described as a "fuzzy" concept (Ross 2014:1) with "manifold meanings" (Chandler 2013:3) in relation to its application in the public arena of policy making and environmental governance. Popular concepts of resilience have focused on the concept as a way to describe the strength of rebuilding following disasters (Justice 2017; Brindley 2018), reflecting an understanding of resilience as the ability to bounce back from shocks or stressors to (social) systems. Social scientists have built on this classic understanding to emphasize adaptive and learning abilities (Walker and Salt 2006) and the ability to adjust values to new realities (Adger et al. 2009). These authors note that the policy choices done in the name of resilience will inherently raise value questions related to responsibilities, burdens, and fairness (Gardiner 2004; Schlosberg, Collins, and Niemeyer 2017). The framing of resilience may shape behavioral responses in relation to how vulnerabilities are accepted or ignored (Chandler 2013), what should count as an appropriate status quo (Rivera and Kapucu 2015), and the role of local communities and state-led initiatives in responding to environmental problems (Aldrich and Meyer 2014).

As in the case of the Anthropocene, the third article of this dissertation engages with the concept of resilience in terms of how it is given meaning and articulated by actors in particular social settings in ways which motivate particular behaviors and policy choices. One of the key tenets of this research is that ideas matter—how relevant actors make sense of the environment and its relationship to society is important because this frames broader discourse as well as possible actions to take in response to environmental problems. Ideas such as risk, resilience, and the Anthropocene are given meaning by communities of actors who seek to shape socio-environmental relations through discursive and material practices in relation to their construction of these concepts. This is not to say that ideas carry on a life of their own, but that the ideas used to articulate and categorize problems and possible solutions present opportunities as well as limitations for how actors imagine possible actions.

2.0 Re-Basing Scientific Authority: Anthropocene Narratives in the Carnegie Natural History Museum

The Anthropocene is both a geological thesis and a cultural narrative of society's relationship with nature. As a geological thesis, the Anthropocene signifies a new Epoch that follows the Holocene, defined by humans as a primary shaper of the Earth's physical properties. As a cultural narrative, the Anthropocene embraces the spirit of this scientific thesis and offers a new way of thinking about the historical and contemporary relationships between people and their environments. This emphasizes that we are moving into a different world of our own making and, crucially, new practices of knowledge production and collective action may be needed in addressing socio-environmental problems. As Lidskog and Waterton (2016:395) suggest, 'the narratives of the Anthropocene also invoke agency, legitimate decisions and motivate actions, not least by constructing shared understanding of a problem.' For instance, the idea that humanity is a primary force in the construction of environments implies the need to reconsider social responses to environmental problems. The types of responses required to address crises like habitat depletion and global warming appear differently depending on our assumptions of agency, responsibility, and the capacity of human action and knowledge.

While many scholars see the Anthropocene as a constructive concept in framing socio-environmental relations, it has endured widespread criticism. Lidskog and Waterton (2016) offer a useful framework for analyzing Anthropocene narratives along these contentious grounds. The authors outline four areas of investigation, though this paper focuses specifically on two: how narratives of the Anthropocene present alternatives to post-political governance and how relationships between science and the public are articulated. These tensions revolve around the

ways that Anthropocene narratives motivate action based on representations of the relations between scientific institutions and socio-political environmental projects.

In recent years, natural history museums have begun engaging with narratives of the Anthropocene. In doing so, these museums grapple with its tensions as they directly relate to museums' missions of cultivating and representing nature, scientific knowledge, and the relationship of each to broader society. Natural history museums have a rich history of motivating and legitimating political projects at the intersection of society and nature. It is important to investigate how museums and the people who operate them deal with the Anthropocene's tensions given these histories and the need to analyze Anthropocene narratives represented in social institutions.

To do this, I analyze how the Carnegie Museum of Natural History ('the Carnegie Museum') embraces the Anthropocene 'as a social and cultural tool for exploring the broad sum effect humans are having on the planet' (Carnegie Museum of Natural History 2018). I ask: How is the Anthropocene operationalized and represented in the Carnegie Museum of Natural History, and what forms of environmental governance are implied and motivated by this representation? Further, how do museum actors make sense of and use the Anthropocene to re-imagine the relationship between science, politics, and society?

The part of the dissertation is organized into three parts. First, I introduce the concept of boundary work to make sense of natural history museums' representations of science and society as motivating and legitimating social and political projects. Here, I explore a contradiction in how scientific authority might be expected to be defended and the processes at play in the Carnegie Museum. Second, I describe my methodological approach, which employs discourse analysis and ethnographic methods to interrogate how and why the Carnegie Museum uses Anthropocene

narratives to re-imagine and re-constitute the meaning of science within society. Third, I show that the Carnegie Museum engages with the Anthropocene in ways which re-base scientific authority[2] on reflexive scientific practices and commitments to social and political issues. In consequence, the boundaries of scientific authority are both expanded to include explicit political questions, and made less salient to better connect scientific to non-scientific modes of thought—legitimizing the role of science as a thought-leader among a network of actors striving for social and political change.

2.1 Representations of Science and Society in Natural History Museums

Natural history museums are important, authoritative institutions that shape public perceptions of the relationship between science and society. Historians have conceptualized museums as tools for natural scientists to disseminate information to the public through popularization processes (Jardine, Secord & Spary 1996; Fyfe & Lightman 2007). This recognizes museums' roles as public arrangers of perception that guide and shape how people categorize and

[2] I use the term 'scientific authority' to reference the role of scientists and scientific institutions in framing and managing societal problems. This differs slightly from 'expert authority' which tends to be the terminology used in discussions of the Anthropocene. I use scientific authority, rather than expert authority, in recognition that the Carnegie Museum is a scientific institution that simultaneously enjoys 'expert' status regarding questions of nature-society and 'scientific' status as an institution engaged in research and representation. I similarly use the term 'scientific experts' to signify the overlap in scientific and expert authority at stake in this discussion.

give meaning to the content within displays and exhibits. Public opinion research has shown they are among the most trusted cultural institutions, in part due to the perception of museums as unbiased arbiters of scientific knowledge (Karp & Lavine 1991; Loukaitou-Sideris and Grodach 2004; Muller 2010). This underscores the importance of analyzing natural history museum narratives, given they communicate scientific concepts and knowledge to (generally) trusting publics.

While many may view natural history museums as unbiased repositories of knowledge, scholars from STS and other fields have emphasized the socially constructed aspects of museum collections and narratives. Macdonald (1998:1) argues that 'science displays are never, and never have been, just representations of incontestable facts.' The nature in museums is made through practices like diorama-building, taxidermy, and artistic renderings of specimen (Latour 2003; Golinski 2005; Henning 2007). As such, they are imbued with ideological and cultural values of the people and institutions that construct them. In a foundational study, Haraway (1984:21) analyzed the political and gendered meanings of a gorilla display at the American Museum, arguing that displays reflected the Teddy Bear patriarchy of the United States rather than offering 'peepholes into the jungle.' This work is important, as it builds an understanding of museum collections as narratives informed by cultural and political ideologies.

2.1.1 Boundary work in natural history museums

My analysis of the Carnegie Museum follows a tradition of analyzing museums as institutions engaged in boundary work through their construction and representation of scientific knowledge and its relation to society (Star & Grieremer 1989; Gieryn 1999; Asma 2001; Alberti 2008). Boundary work refers to practices of establishing the boundaries of legitimate scientific

knowledge, as well as illegitimate knowledge, to establish the authority, autonomy, or some other interest of scientific institutions (Latour 1993; Gieryn 1983; Jasanoff 1990; Daemmrich 1998). I follow Gieryn's (1983:781) suggestion that ''science' is no single thing: its boundaries are drawn and redrawn in flexible, historically changing and sometimes ambiguous way.' These boundaries of legitimate scientific knowledge are (re)drawn and reinforced by institutions that facilitate science-society interactions (Guston 2001).

The boundary work done by natural history museums centers on problems at the nature-society nexus and the appropriate use and role of scientific knowledge. A nature-society divide has long been present in natural history museums, which have historically separated people from nature in two main ways. First, people are rarely included in natural history. When people are included, such as in halls of anthropology, indigenous people are often shown as part of an external nature[3] without genuine cultural histories. Second, dioramas and displays are often silent regarding the work of taxidermists and museum curators in designing, arranging, and constructing museum objects (Macdonald 1998; Whitehead 2008). In separating society from nature, the social aspects of producing knowledge of nature is also hidden. Knell (2007) points out that the need for this data to seem impartial to museum guests can motivate museums to conceal human labor. While science and natural history museums do at times reflect cultural and political processes in their displays, this is often done to justify or assert the importance of the museum (Pettitt 1997; Stanley 2004).

[3] External nature refers to Smith's (2004) typology of external nature and universal nature, with external nature defined as that which is non-human.

2.1.2 Tensions of the Anthropocene in natural history museums

Recently, the Carnegie Museum and other natural history museums have engaged with Anthropocene narratives to explore emergent understandings of society's relationship with nature and science. Lidskog and Waterton (2017) have suggested four major implications of the Anthropocene: 1) it conceptualizes nature-society as co-constructed; 2) it breaks down barriers of scientific disciplines and divisions between science and the public; 3) it offers political opportunities that go beyond post-political governance; and, 4) it suggests new ways of thinking about temporality that understand entities as continually coming into being. Yet, the Anthropocene concept is a contested one, and the nature of these implications depend on how the Anthropocene is articulated and represented. I focus on how the Carnegie Museum deals with the second and third points in its use and representation of the Anthropocene.

Post-political refers to governance processes that ignore issues of power and exclusion, thereby minimizing debate and space for effective social change. The question of political opportunities beyond post-political governance asks whether and how Anthropocene narratives challenge status quo nature-society relations by motivating changes to social systems and/or new forms of politics. The question of science-public relations asks how Anthropocene narratives articulate the responsibilities and capacities of scientific institutions and actors in relation to broader society and other forms of knowledge. Taken together, these contested aspects of the Anthropocene require grappling with the role of scientific knowledge and institutions in framing and managing ecological crises. The representation of science-society relations answers, explicitly and implicitly, questions of how we know the world, who can know the world, and how we think about our capacities to act in accordance with that knowledge.

Whether technological feats such as the Industrial Revolution or geo-political projects such as European colonization of the Americas are the root cause of socio-environmental problems motivate and legitimate different responses. Mainstream accounts of the Anthropocene explain its origin with reference to technological markers – typically either the Industrial Revolution or the Atomic bomb (Steffen, Crutzen, & McNeill 2007; Chakrabarty 2009; Macdonald & Connolly 2015). These mark events that globally altered the Earth's properties through a redistribution of elements in the atmosphere and Earth's surface. This may, in part, suggest that humans have pushed the Earth 'far out of balance, and we must help it regain the stability it needs to function as a self-regulating, highly dynamic, and complex system' (Lynas 2011:10). If human-caused global warming has pushed the Earth's temperature past the brink, geoengineered solutions that cool the atmosphere may be described as the only feasible, near-term answer (Rockstrom et al. 2009; Keith 2013). From these technocratic accounts, a managerial governance strategy is often invoked that encourages urgent manipulation of the Earth (Luke 2017:89).

Lewis and Maslin's (2015:176) Orbis hypothesis moves away from technological teleology by citing Europeans' fifteenth century conquests of the Americas as the Anthropocene's origins. This highlights the global redistribution of organisms through trade as well as the commodification of natural objects as key markers of the new Epoch. Moore (2017:595) argues that mainstream accounts of the Anthropocene fail to account for capitalist processes that ground objects' value on their ability to contribute to accumulation, and that they hide historical and contemporary practices of domination. This history is hidden because the Anthropocene signifies one Humanity rather than placing blame on specific Western actors and capitalist processes. He suggests that our current ecological crisis is better explained by the pressure anthropogenic climate change places on

capitalism's modes of (re)production than by an appeal to us transcending nature's limits (2017:598).

Further, scholars may worry that Anthropocene narratives will facilitate states of emergency that justify stringent, preemptive practices (Cooper 2006; Luke 2009; Gore 2013). The worry may be, for instance, that the technological fixes pursued and justified through appeals to crisis are imbued with uncertainties and may themselves contribute to ecological crises in ways we cannot predict. These worries may be overlooked if technological fixes are justified through appeals to objectivity, which may additionally hide underlying value questions like who should bear burdens and how much risk is tolerable.

Clark (2014:22), however, describes the Anthropocene as an ecological crisis that is more than gloom and doom. He draws on Honig (2009) to suggest that if the Anthropocene is a crisis, there is reason for hope that people can turn this new conception of nature-society into new political possibilities. Machin (2019) suggests similar possibilities, arguing the Anthropocene offers an opportunity to re-imagine the actors—the 'we'—involved in managing political-ecological problems by focusing on who is excluded from political decisions as well as ways to re-draw these boundaries. As a narrative tool, the Anthropocene may provide a way to collaborate on how to do the work of planetary stewardship by, for instance, promoting trans- and inter-disciplinary research on environmental problems or recognizing the need for closer and better relations between science and society (Steffen et al. 2011; Ellis & Trachtenberg 2014; Bamosky et al. 2014). If the Anthropocene were to foster better or broader connections between science and the public, representations of scientific knowledge would acknowledge the capacity and legitimacy of amateurs, activists, and other interested parties in claiming and using diverse forms of thought to frame and respond to social problems.

From these accounts and critiques, the tensions in representing the Anthropocene in natural history museums become apparent. While the Anthropocene could be represented in ways that challenge status-quo relations and expand political opportunities, it may, alternatively, legitimize worrying technological fixes that risk compounding our problems and limiting public deliberations of collective problems.

2.1.3 (Un)Expected Boundary Work in the Carnegie Museum?

To interrogate further what kinds of relations between science and society the Anthropocene legitimates and what forms of governance it motivates, we should move to analyzing how the concept is operationalized in social institutions. Studying how museum actors grapple with the Anthropocene in ways that motivate and legitimate some form of science-society relations is an important addition to the more abstract debates on the implications of Anthropocene narratives. This is particularly important when these concepts and narratives may contradict historical narratives of science.

Boundary work in natural history museums has tended to defend scientific authority and legitimacy on appeals to access to an objective and neutral truth. By marking certain issues as scientific problems, scientists and scientific institutions maintain authority over those problems in part by downplaying the role of non-scientists and non-scientific views. For instance, when socio-environmental issues are defined as problems in need of scientific solutions, the political, moral, and economic aspects of the problems may be ignored in favor of technical solutions by scientific experts (Bocking 2004). Given this history, we might expect the Carnegie Museum to employ the Anthropocene in ways that fit these parameters. In other words, we might expect Anthropocene

narratives to affirm scientific objectivity and neutrality, thus establishing the scope of scientific authority and its boundaries vis-à-vis other types of knowledge.

However, some scholars have shown alternative ways of defending scientific authority (e.g. Nielson 2008; De Pryck and Wanneau 2017). In an analysis of (anti-)boundary work, De Pryck and Wanneau (2017) show that discourse within the Intergovernmental Panel on Climate Change and Future Earth—two international sustainability initiatives—works to oppose traditional science-society binaries through calls for interdisciplinarity, transdisciplinarity, and solution-oriented science. In their account, the authors show how scientists, policy-makers, and other actors understand the scientific community as having obligations to use scientific knowledge in pragmatic, socially-beneficial ways. Discourse within the organizations reflects these social obligations, as actors regularly call for fewer divisions within the scientific community and between, for instance, scientific and business communities. The scientific community legitimizes its leadership role over sustainability issues given its commitments to solutions-oriented knowledge, representing a shift from adherence to neutral, problem-oriented knowledge production processes.

Similarly, the Carnegie Museum works to re-base scientific authority on reflexive scientific processes and the usefulness of science for managing social and political problems. Though these contradict expected ways of defending scientific authority, I demonstrate they can function in this way. While traditionally understood processes of boundary work establish legitimate scientific knowledge through appeals to objective or neutral truths, the Carnegie Museum appeals to scientific processes of acknowledging and managing its own social and political values to redraw boundaries of legitimate knowledge. This is done through the performance of self-critique, explorations of uncertainty in knowledge, an open examination of internal cultural and political

values, and an explicit adoption of political ideologies that foreground a pronounced role of the scientific community in society as justifications for actions. Further, scientific authority is established in virtue of science's connection to non-scientific forms of thought rather than as opposed to them. The Carnegie Museum recognizes an inherent link between scientific, artistic, and ethical thinking, whereby the latter are needed to productively construct and make use of scientific knowledge.

There are at least two implications for how we understand boundary work given this re-basing of scientific authority. First, the ways in which scientific actors defend scientific authority implies different scopes and types of boundaries between scientific and other forms of thought. In the case of the Carnegie Museum, the scope of problems for which science has authority is expanded to include explicitly political questions given a political basis of legitimacy. Meanwhile, otherwise rigid boundaries between legitimate scientific knowledge and illegitimate knowledge are made less salient, formulating a role for the scientific community as leaders acting alongside other thought-leaders.

Second, we see that the type of authority on which scientific institutions base their legitimacy is tied to the types of goals which that authority is meant to achieve. The Carnegie Museum's goal of engaging in explicitly political debates and struggles requires an authority rooted in the cultural and political values from which it is motivated. Instead of constructing boundaries that separate the partial and subjective from the neutral and objective, boundaries are drawn around science's ability to grapple with its own internal values, commitments, and weaknesses as well as its unique contribution to managing social problems. By establishing scientific authority in virtue of reflexive processes and connections to non-scientific knowledge,

the Carnegie Museum employs Anthropocene narratives in ways that encourage new political opportunities and strengthen ties to broader publics.

2.2 Methodology: Analysis of a Cultural Narrative

I analyze the Carnegie Museum's Anthropocene narratives through qualitative discourse analysis and ethnographic methods with the objective of understanding how and why museum actors represent science and society. My focus is on the discursive representation of the Anthropocene in the museum's displays and public communications, as well as in museum workers' accounts of the Anthropocene. I take discourse to be 'an ensemble of ideas, concepts, and categories through which meaning is given to a phenomenon, and which is produced and reproduced through an identifiable set of practices' (Hajer & Versteeg 2005:175). Discourse sets the conditions in which social problems are viewed and perceived and thus is a primary tool to (re)construct boundaries. I use ethnographic methods in interviewing museum actors and interacting with museum spaces to understand how individuals at the Carnegie Museum make sense of the Anthropocene given their individual and institutional experiences with the concept. I focus on the representation of scientific knowledge, scientific expertise, and the role of each vis-à-vis broader society. Thus, I also focus on the representation of the role non-scientific institutions and actors play in grappling with and responding to problems that may be categorized, in part, as scientific problems.

I triangulate multiple data sources to locate boundary work processes, which can be broken into three groups: museum displays, interactions with museum workers, and external documents

from the museum. Analysis of museum displays centers on the temporary exhibition 'We Are Nature: Living in the Anthropocene.' Museum displays offer rich data to document and analyze discourse as they are the primary interface between the museum and the public. My analysis builds on Hall's (1980) approach that takes museum displays as constructs that are shaped by cultural conventions and whose analysis can yield cultural meanings and contexts. I conducted three, two-hour site visits to the museum, taking 128 photographs, 40 minutes of video, and fieldnotes on the content and style of the displays. During these site visits, I also observed how visitors interacted with the We Are Nature exhibition, which included multiple interactive elements for guests to reflect and respond to what they saw and heard.

My interactions with museum workers involve interviews and guided tours of the museum in which I hear museum workers' accounts of the Anthropocene and the museum. I conducted four in-depth, semi-structured interviews with key actors—two senior directors and two curators of the We Are Nature exhibition—that lasted between one and two hours. These interviews focused on two overarching of questions. First, how do museum leaders make sense of the Anthropocene? Second, how is the Carnegie Museum embracing Anthropocene narratives? These questions focus on process and sense-making questions to highlight actions being taken and how respondents' make sense of those processes.

The two directors were instrumental in bringing the Anthropocene into the museum. Both are natural scientists by training and have spent most their careers conducting research in academic settings. One director came to the Carnegie Museum after being involved with a separate natural history museum in a different country, seeing the museum as a unique place to leverage scientific knowledge to inform and interact with the public. The other director has been involved with the Carnegie Museum for close to a decade, working closely with the research initiatives and output

of the museum in addition to its collections of artifacts and specimen. The curators who helped construct the We Are Nature exhibition were not formally employed by the Carnegie Museum, collaborating on this Anthropocene project as content experts. Each of the curators has an artistic background, working on projects that center on the connection between art, science, and public engagement. Their work in the We Are Nature exhibition highlights the Carnegie Museum's approach to the Anthropocene as embraced practices in addition to narratives to be represented.

In addition to these four in-depth interviews, I took part in a guided walking tour of the Carnegie Museum organized through the University of Pittsburgh's Art and Architecture department's 'Consuming Nature' workshop. The workshop brought together fifteen humanities and social science scholars to discuss the broad topic of human interactions with nature. The tour took us through the research facilities at the Carnegie Museum and included six scientists' accounts of how their work intersected with the Anthropocene—two biologists, two geologists, and two paleontologists. Their accounts touched on the reasons it is important to talk about the Anthropocene, how they viewed their research in relation to social forces, and the human role in translating scientific research into museum displays. During their accounts, the scientists presented artifacts and specimen from their collections to showcase the social and human forces that shape the life of the artifact and how it is presented to the public.

The contributions and accounts from the four in-depth interviews are interpreted through the individuals' roles as key shapers of Anthropocene narratives in the Carnegie Museum. The accounts from the scientists on the Consuming Nature tour, as well as the interviews with the two directors, are interpreted by emphasizing museum scientists' sense-making of the museum's engagement with the Anthropocene as practice and discourse. I leave the interview respondents

nameless, instead referring to individuals as their dominant role at the museum (e.g. Director of Science; Museum Biologist; Guest Curator).

The third group of data contains an array of documentary sources, including local media coverage featuring interviews with directors and curators as well as museum-produced documents and reports found on the museum's website. In total, this included four media interviews with museum workers, three papers written by museum workers, and dozens of media reports, newsletters, and similar documents published through the museum's website. Additionally, the Carnegie Museum hosted the 2017 International Committee for Museums and Collections of Natural History Conference under the title 'The Anthropocene: Natural History Museums in the Age of Humanity.' The conference provided substantial documentation to analyze Anthropocene narratives in the form of spoken presentations, the conference program, and a report from the Anthropocene Working Group. This documentary data was helpful in adding context to data gathered from field observations and interviews.

2.3 Re-Basing Scientific Authority with the Anthropocene

2.3.1 A Brief Description of the Anthropocene in the Carnegie Museum

The Carnegie Museum's 'We Are Nature: Living in the Anthropocene' exhibition consists of information-driven exhibits in the form of traditional dioramas, interactive displays, and videos, in addition to activities for guests to reflect on those exhibits in the form of meditation, reading, and art. The exhibition, which is free with regular admission, opens by asking, 'What the heck is

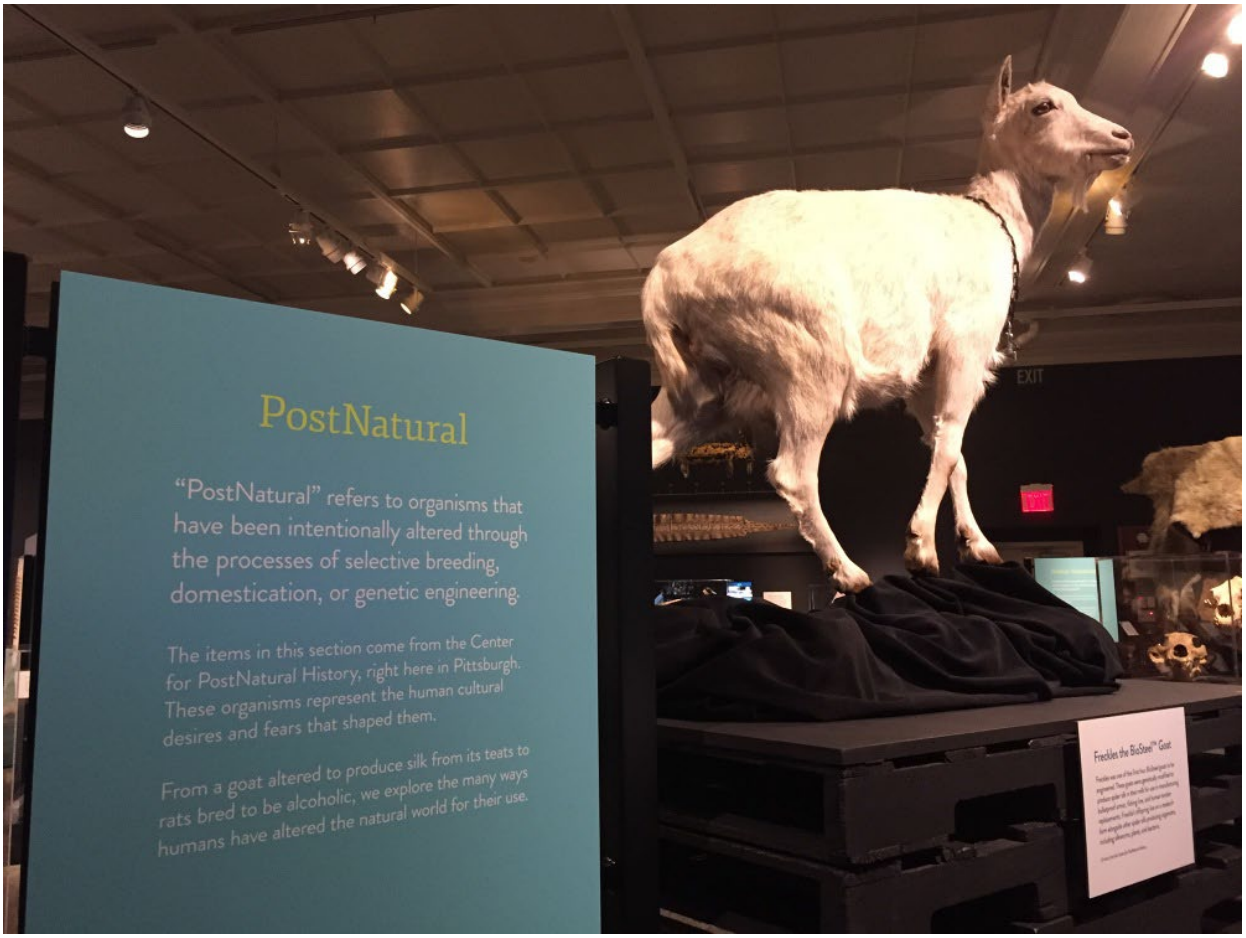
the Anthropocene?' The offered answer emphasizes that human impacts on the earth are as strong as natural forces, and that we are not separate from nature – rather, 'we are nature.' This is shown through an interactive display where guests are asked to touch sections of an urban map that are nature until the entire map—built environment included—is lit. The exhibition defines the Anthropocene as a Cultural Era similar to the Renaissance.

In interviews with the two directors, the geologic debate of if and when the Anthropocene began as an Epoch was described as much less interesting than its role in offering a new way of thinking. The Director of Science suggested that geologic Epochs don't actually exist; rather, they are useful metaphors that help specific scientists think about the history of the Earth (ID#110112017, Nov. 2017). The more useful way to think of the Anthropocene is as a mindset that exposes the myth of nature versus society. Breaking down this false dichotomy is at the crux of the Carnegie Museum's Anthropocene project. She elaborated, 'If there is something that is 'nature,' there must be something outside of it, so what does it mean? If I could find a way to talk about the things we do in this museum without that word, I would strike it from our language' (ID#110112017, Nov. 2017).

Six key categories of human-abetted changes are described in We Are Nature: pollution, habitat alteration, postnatural, climate change, inequality, and extinction. Pollution, habitat alteration, climate change, and extinction focus on the ways that human activity has accelerated ecological and planetary crises at a rapid level. These are connected to human well-being, such as electricity bills and dangerous exposure to UV rays, as well as the health of other species and ecosystems, such as plastic in rock formations and coral reef depletion. Regarding inequality, the exhibition states that 'many effects of the Anthropocene disproportionately impact those in lower income brackets,' due to insurance premiums, growing inequality, lower crop yields, and fiercer

storms. Postnatural refers to organisms that have been intentionally and heritably altered by humans, such as modified corn, rats bred to be alcoholic, and a goat bred to produce spider's silk for the United States military. The manipulation and use of nature to meet human ends is a repeated theme throughout the exhibition.

Figure 1. A goat altered by the US military to produce silk. Photo Courtesy Rich Pell, Center for PostNatural History



Urgency and gloomy imagery are prevalent, as may be expected in a science-based depiction of ecological crises. Visitors are invited to sign a funeral book for the Great Barrier Reef, which predicted to be dead by 2050. The melting of glacial ice is described as a downward spiral

where the Earth gets warmer, ice melts, and the Earth has less ice to keep it cool, thereby getting warmer even faster. A story is told of an albatross chick starved to death from eating bits of plastic fed to it by its mother. Visitors are encouraged to vote for the next extinct species, given that we are predicted to lose two-thirds of our wildlife by 2020—will it be the black rhinoceros, mountain gorilla, or pangolin? To vote, visitors place money in designated jars, with proceeds going to the World Wildlife Fund.

This helps define how the Carnegie Museum articulates ecological crises: they are severe, yet there is hope if we immediately act under the leadership of the scientific community. Moreover, these crises are not described as having bypassed some threshold that would require people to re-establish balance to Earth systems. The narrative consistently frames the instability of the Anthropocene as us having caused a problem for ourselves and other species' livelihoods and future, not the Earth's ability to regulate itself writ large.

Following the main exhibits, visitors are asked to 'take a moment to sit and contemplate your place in this universe,' surrounded by quotes encouraging visitors to take heed of scientists' messages. For instance, a quote attributed to Janet Swim et al. states, 'Scientists' warnings about the dire consequences expected from unchecked climate change can generate affective responses…that can in turn affect willingness to act on the information.' Visitors are offered tools to mentally process the Anthropocene through meditation, reading, writing poems, and drawing. Visitors can stick Post-it notes to a wall to describe their feelings—many describe feeling empowered, motivated, or depressed, though plenty of visitors feel angry, curious, or guilty.

Figure 2. Visitors reflect on how We Are Nature makes them feel. Photo Courtesy Carnegie Museum of Natural History

Finally, visitors are encouraged to engage in collective action to improve the environment. The exhibition includes examples of how to be locally involved, such as river clean up and citizen science initiatives. It also shows how the museum itself is involved in environmental activism, highlighting research efforts that monitor biodiversity and human impacts on habitats.

2.3.2 Re-Basing Scientific Authority: The Scope and Nature of Boundaries

My analysis focuses on how museum actors have operationalized and represented the Anthropocene with regard to the two aforementioned tensions. I show that the Carnegie Museum deals with these tensions by re-basing scientific authority in pursuit of its political ambitions, and

uses representations of the Anthropocene to justify and enact this type of authority. This section of the paper explains 1) the goals and motivation behind the Carnegie Museum's engagement with the Anthropocene, 2) how the museum's pursuit of these goals is legitimized given a scientific authority re-based in reflexive scientific processes and commitments to social and political problems, and 3) how, in practice, the Carnegie Museum and its actors enact this type of authority through Anthropocene narratives. The succeeding section, then, discusses the consequences for how we respond to the Anthropocene—in particular, how political opportunities beyond post-political governance are motivated and the kinds of connections that are established between science and the public.

2.3.2.1 The Motivations of the Carnegie Museum

Museum actors refer to a new era of natural history museums defined by their public orientation as social institutions. There may be multiple reasons for the emergence of this stage, though Carnegie Museum actors suggested two important ones that reflect social science literature on museums. In the 1970s and 80s, natural history museums faced difficulties securing funding, exposure, and relevance. As private endowments grew dry, museums needed to compete with other industries for the public's attention and the government's allocation of funds (Muller 2010; Nudds and Pettitt 1997). The Director of Science put it this way:

> For a long time, the Carnegie Museum funds were, not exactly unlimited, but as I understand it, the place routinely overran its budget and just went for more money. There are a great many more non-profits vying for those same funds, and the landscape of benefactors in that way is also changing as much as the generations change…Institutions that are not challenged for long periods of time develop a great deal of complacency, and they stop looking outward…and, the way I think

about it is that maybe five years ago this slumbering giant woke up (ID#110112017, Nov. 2017).

Adding to this, the Director of Museum suggested:

> [This new] phase is where it is still outward facing, but now the subject matter is actually externally driven, either from issues in the world or public desires to engage (ID#12112017, Nov. 2017).

Scientists started to see the museum as a source of inspiration for society that could act as a positive influence on behavior (Davis 1996). The International Committee for Museums and Collections of Natural History Anthropocene working group cites multiple scientists who call for museums to 'empower the electorate to make informed, scientifically literate decisions (American Association of Museums 2011)' and '[coordinate] more effective public communication on and engagement with climate change (Rees 2017)' (Koster 2018). A Museum Paleontologist suggested that the perceived loss of scientific credibility encouraged scientists to engage politically as a response to the rhetoric of state officials and mass media that lacked real urgency regarding climate change, habitat depletion, and other ecological crises (Museum Paleontologist, Personal Communication, June 2017). The Director of Museum added, 'with our current, very difficult government context and the kinds of really retrogressive dialogues that we're having around social relationships, [telling stories about climate change] is more important than ever.' He continued that this connects with the funding question, as it is 'good business to focus on customers, who care about conservation and what the museum is doing for the wilderness, biodiversity, and climate change (ID#12112017, Nov. 2017).

These quotes reflect a recognition of the public as a motivating factor throughout the museum's work. Expanding on the unique position of natural history museums to engage the public, the Director of Museum describes the Carnegie Museum as:

> at the crux between nature and its artistic representations…we're a little bit of Harvard and a little bit of Disney, taking deep intellectual concepts and making them not only accessible but fun. We are the gateway of the arcane to the accessible (ID#12112017, 2017).

As the Carnegie Museum works to represent and initiate discourse on ecological crises, it does not do so as an institution removed from public and political deliberations; rather, these deliberations are reflected in the museum's explicit political orientation from the start. The museum engages with these topics out of a sense of political duty to motivate change.

2.3.2.2 Justifying a Value- and Social-Oriented Legitimacy

The legitimacy of the museum is seen as vital for the Carnegie Museum to guide social discussions and responses to environmental problems. In a post on the museum website, the Director of Museum argues, 'whether we truly are more credible than other types of institutions or not, our self-perception provides a significant opportunity to strive for best practice.' The Carnegie Museum uses the Anthropocene to highlight the values of the scientific community and builds a case for authority based on reflexive scientific processes that accommodate and manage these values. In doing so, the Carnegie Museum explicitly politicizes ecological crises and justifies the lead role of scientific institutions in addressing them.

The Director of Science explained that the Anthropocene offers grounds to investigate the historical hubris of scientific enterprises:

> I look at the really profound changes that we are generating in the troposphere and in general, and I think, how did we get ourselves into this trouble? It's sort of like being a teenager, getting to the point where you can drive and buy beer, and all of the sudden you're powerful in new ways—and that generally goes bad at the beginning, right? So, we've gained this great power and it's done amazing things. We cured diseases and increased the quality of material existence. Yet, these came with gigantic unintended consequences—sea-level rise, violent storms, mass extinctions…the real value of science comes from poking holes in that which we do not know to get closer to the truth (ID#110112017, Nov. 2017).

She goes on to say, 'on a global scale, we're influencing all of these things. In that way, it's appropriate for us to be thinking about this as the Anthropocene. It's also a little like calling it the age of me, right? And this is part of the problem that got us here to begin with' (ID#110112017, Nov. 2017). To justify the lead role of the scientific community despite this, the Carnegie Museum suggests moving beyond modernity's mere focus on rationality toward greater awareness of scientific inquiry's fallibility, limitations, and uncertainty.

First, attention is drawn to the political and social contexts of historical scientific practices. This is represented particularly well in the Postnatural section of the exhibition. A Guest Curator explained Postnatural history as 'a subset of the Anthropocene…it's the intentional influence over biology instead of human influence over everything' (ID#18112017, Oct. 2017). The focus of Postnatural history in We Are Nature is on historical practices of engineering living organisms to meet the needs of society in particularly troubling ways. The same curator suggested to 'consider these things as a part of larger cultural-social-economic systems; ones that have histories. These aren't just magic tricks—they're produced by companies, industries, governments.'

Museum actors also highlight the need to have ownership over the values and interests of natural history museums. The Director of Museum explained:

> Climate change is going to destroy society as we know it…we have a social responsibility to help people understand what's going to happen and how they may be able to adapt. To be at the forefront of change, and not being led by it but being one of the leaders of that dialogue (ID#12112017, Nov. 2017).

He stressed that We Are nature can help build awareness of crises that are being ignored, downplayed, or disputed by powerful politicians and media. This point is reinforced by a Museum Biologist who used Twitter to express discontent with President Trump's actions regarding climate change, urging that we recognize and confront the role humans have played.

Rather than constructing a veil of objectivity, the Anthropocene narrative centers environmentalist values, thus justifying the importance of natural history museums to encourage these values in society. Two Museum Geologists at the Carnegie Museum discussed how much of the Anthropocene is not new—we have had profound impacts on the environment since we have existed. What is new, though, is the recognition that we are making life more uncomfortable for ourselves at an accelerated rate. They suggested that the Anthropocene, at its core, is a political argument made by people who want more action and awareness around these problems (Museum Geologists, Personal Communication, June 2017).

Second, the authority and legitimacy of scientific knowledge is defended on its connection to other modes of thinking rather than opposed to them. The scientific community is situated as part of a complex social world that needs collaborative partners to tackle daunting social issues. These other modes of thinking help connect scientific knowledge back to the types of social and political projects that motivate it. The Carnegie Museum focuses particular attention on

incorporating artistic and ethical modes of thought into its representation of the Anthropocene. The Director of Science explained that the Anthropocene helps identify the limitations of scientific thinking:

> Science has its power because of its rational nature. We think of the universe as a gigantic machine composed of parts, and if we keep at this long enough, we'll know those parts. That's a useful metaphor, and we've done powerful things with it. But it's only a metaphor, and really all these things we call parts are inextricably interconnected (ID#110112017, Nov. 2017).

In describing the usefulness of non-scientific thinking to connect broader ideas, creativity, and social issues to science, she posed and answered, 'Where do you learn the arational thinking, which is where the power in this whole thing comes from? We need to talk to philosophers, we need to talk to artists' (ID#110112017, Nov. 2017). A Guest Curator reflected this sentiment, suggesting artistic perspectives can connect what we know 'in terms of science, measurement, and conclusions from those measurements to a broader context: why are we here? And where do we go from here? And what does it mean to be human?' (ID#18112017, Oct. 2017).

In the We Are Nature exhibition, the scientific process is framed as the entry point to investigating environmental crises, but visitors are encouraged to make up their own minds about what scientific knowledge means to them as individuals and as members of a community. The exhibition contains messages on displays that implore guests to 'Think about how scientific knowledge applies to you and your community,' 'Ask yourself the importance of learning about your environment,' and 'Question what you know.' Speaking again of ecological problems like climate change and biodiversity loss, the Director of Science said, 'These are gigantic problems,

and if we ask how science solves these problems? The answer is science cannot' (ID#110112017, Nov. 2017).

2.3.2.3 Performing and Enacting Authority in the Carnegie Museum

While museum actors draw on the Anthropocene to re-imagine the boundaries of scientific authority, they perform and enact this authority in their representations of that same concept. The museum engages in self-critique by highlighting the role of people in constructing and representing science. For example, the museum held a symposium dedicated to exploring histories of colonialism and racism in a diorama named 'Lion attacking an Arab courier,' which was found to have used a real human skull in the courier's mannequin. A Guest Curator explained that 'the courier is wearing clothing from five different North African cultures…it says as much about Western colonialist culture than North African natural history' (ID#18112017, Oct. 2017). The symposium aimed to explore the historical construction of this diorama, and the diorama was re-presented in the museum under this new framing.

Curating was described as a collective, social process that required interaction between the museum staff, scientists, and the public. The Director of Science explained:

> We're in a time period where there's a transition in how we think about what a curator is. The curators are ultimately for all aspects of curation, but in fact many of the parts of curation are carried out by other people in and out of the museum. So, the curator is a collective thing, a social thing (ID#110112017, Nov. 2017).

Building on this, a Guest Curator explained the unique role of the Anthropocene in building this social practice which re-tells stories that place humans in nature. 'We [dug] through parts of

the collection, using database searches and interviewing various curators to find different stories of old objects…like a bald eagle inadvertently shot out of the sky during the Battle of Gettysburg (ID#18112017, Oct. 2017).'

The tour focused on the sculpting work required to imagine and mimic natural specimen. A Museum Paleontologist explained the process of sculpting fossils and plaster replicas of those fossils in explicitly artistic terms. 'I'm a scientist, but I'm also a sculptor. If you look at a clay-maker's set of tools and my set of tools, we're working with the same equipment' (Museum Paleontologist, Personal Communication, June 2017). This was put into the context of requiring artistic renderings and imaginations of objects we do not experience—such as dinosaurs.

The We Are Nature exhibition makes a point to highlight the work of scientists, curators, and artists who helped bring together its collection of information and displays. Biographies of the scientists who pioneer research on climate change, biodiversity loss, and other topics are attached to displays in a way you might expect to see at an art exhibit.

Further, artistic perspectives help connect artifacts to their environments. The Director of Science explained why a bird exhibit needs more than simply the bird's body, saying, 'Everything about the bird is a reflection of what the world around it has brought out of it over time. The bird is a memory of what worked for birdness' (ID#110112017, Nov. 2017). Embracing the Anthropocene means treating the world as a collection of objects connected with each other rather than in isolation. Thus, we see that the Anthropocene is used to bridge connections between artifacts and their environments with an emphasis on the human role in acquiring, learning about, and displaying them.

A Museum Biologist explained that the museum's engagement with the Anthropocene encouraged him to think of a collection of beetles both in terms of their aesthetic beauty in addition

to their scientific relevance. Further, another Museum Biologist suggested the Anthropocene narrative inspired their lab to look closely at the human imprints on their beetles and other specimen. Both examples show how the Anthropocene narrative encouraged new scientific questions by connecting art and science.

Finally, art is emphasized as a crucial method for visitors of the exhibition to reflect and react to what they have learned and experienced in the museum. We Are Nature asks guests to take a moment to think about what the articulated crises and ecological circumstances mean for them, their neighbors, and the world. Having read and watched exhibits that detail large changes to Earth, visitors are given the means and space to reflect on what this means to them. They are asked to reflect on what we ought to value and prioritize in our responses, and the extent that these values should be considered. Importantly, rooms are provided to engage in poetry, drawing, reading, and meditation to work out these thought processes and share them with other museum guests.

On its website, the Carnegie Museum emphasizes bird conservation, climate education, and the struggles of indigenous communities to protect water and land as key Anthropocene initiatives (Carnegie.org, Jan. 2018). In the exhibition, citizen science research programs are highlighted alongside art galleries as important responses to grapple with complex problems. The exhibition stresses the need to follow the lead of scientists and museums who research challenges like climate change and a soaring population, with solutions depending 'on community, collaboration, and cooperation…initiated and promoted by groups of people forming new and perhaps unlikely alliances.' This reflects the Carnegie Museum actors' commitments to artistic and other perspectives when contextualizing scientific knowledge and finding broader meaning.

1.3.3 Discussion: Consequences for Responding to the Anthropocene

In re-basing scientific authority on reflexive scientific processes and explicit social and political commitments, the Carnegie Museum legitimizes scientific leadership over socio-environmental problems while simultaneously broadening and politicizing discussions of those problems. Whereas a scientific authority based on appeals to objective and neutral truths seems antithetical to broadening the types of knowledge we draw from in responding to socio-environmental problems, this re-basing of authority focuses on science's necessary connection to other forms of thought to legitimize goals of using science in service of political struggles. By using the Anthropocene to both justify and enact this re-based authority, the Carnegie Museum offers answers to theoretical tensions of the Anthropocene.

The directors of the Carnegie Museum each stressed that the most important work done by the Anthropocene is communicating and encouraging a new way of seeing how our connections to nature are widespread, in need of change, and not entirely certain. Separately, they reflected on the role of capitalism and commodification, as well as modernity's dualism between humans and nature, in motivating irresponsible practices like over-extracting Earth's resources (ID#110112017 and ID#12112017, Nov. 2017). While not made explicit in the exhibition, critiques of these historical practices are implied in the Arab courier symposium, the Postnatural collection, and the types of political movements and campaigns that are encouraged.

The Carnegie Museum articulates the role of scientific institutions, and natural history museums in particular, as social leaders acting alongside an array of other actors. The unique role of the museum as a bit of Harvard and a bit of Disney encapsulates this, backed by the firm belief that museums should play a role in challenging status quo political practices and discourse that ignore the overwhelming force of humans on nature. This weakens the supposed tension between

expert-led and public-led initiatives, as the museum simultaneously supports research efforts, conservation efforts, public education efforts, and environmentalist political and cultural movements.

The emphasis on uncertainties within scientific thinking is followed by an encouragement to bring in other ways of making meaning—namely art—to help grapple with the complex questions of what the Anthropocene means for people. In other words, socio-environmental problems are made more-than-scientific. Further, scientific practices themselves are shown to borrow from, build on, and be aided by artistic perspectives. The Carnegie Museum legitimizes the need for scientific leadership over social problems while also acknowledging the need for other ways of knowing to help deliberate value-laden questions.

2.4 Conclusion

This paper has sought to understand better how scientific and cultural institutions engage with the Anthropocene. Based on my case study of the Carnegie Museum, I have put forth a central thesis: the Anthropocene offers a way for scientific institutions to re-base scientific authority around an explicitly political agenda. Specifically, through its representation of the Anthropocene, the Carnegie Museum has based its legitimacy and authority on reflexive scientific processes and constitutive relations with other modes of thought. I have used the conceptual perspectives of boundary work in museum contexts (Gieryn 1999; Asma 2001; Alberti 2008) to frame my study, thus leading to a few key insights regarding scientific boundary work, authority, and legitimacy.

My analysis shows that museum actors explicitly and openly acknowledge their political values as motivations for engaging with the Anthropocene in the museum setting. While technocratic narratives of the Anthropocene may have been expected given expectations for scientific authority to be defended on appeals to objective and/or neutral truths, the Carnegie Museum's politically motivated representations of the Anthropocene suggest an alternative understanding and basis of authority. As such, we can see how institutional goals and ambitions are linked to specific understandings of authority. In this case, for instance, museum actors enact notions of authority based on scientific processes that can properly manage internal political values rather than veil them. This builds our understanding of scientific authority as a socially-constructed, goal-contingent, and setting-specific process.

Further, we see the unique role natural history museums can play in re-drawing the boundaries of scientific authority given their location at the crux of nature and its artistic representation. Since the museum's goals cohere with an authority based on self-critique and acknowledgment of limitations, the connections between scientific and other modes of thought are shown to be necessary in legitimizing scientific institutions' explicitly political actions. The Carnegie Museum has used the public performance of these science-art connections as a key strategy to re-base its legitimacy and authority.

More generally, this paper sheds light on the behaviors of scientists and scientific institutions engaging in explicitly political actions in their (representations of) scientific inquiry. More research on similar political actions could and should be done to better understand this re-basing of scientific authority. For instance, pro-science marches in the United States—which are often based in positivist ideologies of scientific authority—aim to promote the role of science in guiding democratic decisions, especially regarding challenges such as climate change. Do

processes of justifying and enacting scientific authority within these marches look similar to the Carnegie Museum's representation of the Anthropocene? Moreover, this paper offers a way of understanding scientific authority, and the justification of that authority, which may serve as a rebuttal to criticisms that describe this explicit politicization of science as limiting public participation. To the contrary, leveraging scientific knowledge and processes—if rooted and justified in these ways—may encourage broader, and more open, public dialogue and actions.

The next article similarly engages with how actors make sense of environmental problems, but focuses on the local consequences of a particular problem—sea-level rise—and the institutions which are used to frame and respond to its consequences.

3.0 Building Trust in Expert Settings: An Analysis of Miami's Sea Level Rise Committee

Expertise in modern societies entails a tension between authority and trust, as expertise acts as both a source of authority and a channel of wider public trust. This is increasingly the case in contemporary times as we collectively attempt to manage ever-more complex social problems. Yet, as experts are entrusted with significant authority, they are often not in fact trusted by the general public. This is important, as trust has been shown to be an important factor for successfully managing socio-environmental problems (Kettle and Dow 2016), and given that ensuring trust is often a key goal of cities and local governments (Jabareen 2015).

What does it mean to have trust between experts and the public? How does trust relate to the politicization of a social problem? Under what conditions do expert-public interactions facilitate trust? I attempt to answer these questions through an analysis of Miami's SLR Committee. In doing so, I identify two factors that help explain why trust is facilitated in this particular setting: a newly recognized problem initiated new forms of expertise, and advocate-experts facilitated interactions between experts and the wider public.

In Miami, 'sea level rise expert' was not an established group, did not infer a set of commonly recognized credentials, and was established to manage a newly recognized problem that entailed ambiguous responsibilities and meanings. The committee, then, was open in terms of personnel, goals, and scope. Further, advocate-experts—experts explicitly named to advocate for marginalized communities—facilitated interactions between experts and the wider public. This allowed community-driven narratives to be framed in ways that could be heard by fellow experts, filling blind-spots and aligning expectations and meanings rather than competing as alternatives.

Further, these advocate-experts brought expertise to the communities in novel ways. Building trust, then, is shown to be a dynamic process where experts need to trust the public and vice versa—not merely a unidirectional state of affairs.

The first part of the paper introduces my conceptual framework, building on interactionist concepts to analyze empirical themes of trust, politicization, and expertise. In doing so, I introduce *negotiated expertise* as a process whereby interactions between experts and publics facilitate trust in politicized settings. The next part of the paper introduces the historical context and setting of Miami's Sea Level Rise Committee, laying out the conditions of mistrust and authority between community members and the committee. The final part of the paper explains why, perhaps unexpectedly, trust was facilitated by expert-public interactions in the context of this politicized socio-environmental problem. I make the case that the openness of the committee facilitated an inclusion of diverse sensibilities that were collaborative rather than contradictory, and that advocate-experts were fundamental for successfully integrating these various meanings and expectations.

3.1 Conceptual Framework

3.1.1 Interaction Orders and Trust Conditions: Shared Meanings, Expectations and Commitments

Hilgartner's (2000; 2004) work in *Science on Stage* is a fruitful example of bringing symbolic interactionist insights into research on expertise. Using the stage management metaphor,

Hilgartner offers a theoretical framework for analyzing the construction of credibility by highlighting the "constitution of voices and the dialectic of revelation and concealment" (Hilgartner 2004:450). Taking cues from this work, I focus on the ways in which experts themselves influence structures and contexts of expert-public interactions.

I use the analytical framework of interaction orders and their requisite trust conditions to guide my analysis. Interaction orders refer to the collectively negotiated rules and meanings that facilitate social interaction, which afford actors a sense of self and coordinate action. Goffman (1983:5) describes them as "enabling conventions, in the sense of the ground rules for a game…" Interaction orders in expert settings can be thought of as the set of rules which constitute the authority and meaning of expertise as well as their (inter)actions amongst themselves and with the public.

Productive and working interaction orders require that people trust each other's commitment to reciprocal practices that generate shared meaning. Garfinkel (1963) explains trust as "a condition of stable concerted actions" which facilitates day-to-day interactions. When trust conditions are absent or unmet (i.e. because of inequalities or division between people), interaction orders may be susceptible to break down and fail to facilitate cohesive collective action (Rawls 1987, 2000; Duck 2017).

I conceptualize trust as shared meanings, expectations, and commitments—the ingredients of a productive and working interaction order. Thinking of trust in this way, expert-public interactions facilitate trust when their contexts and processes work toward reciprocal practices that generate shared understandings and orientations. This sets my discussion of trust apart from studies which take trust as a one-sided and static state where the public believes in or finds experts to be credible.

3.1.2 Politicized Socio-Environmental Problems: New and Constrained Meanings

Environmental hazards and disasters may strain social relations, expose social divisions, and/or motivate people to re-imagine socio-environmental relations (Quarantelli 1987; Bolin and Stanford 1999; Hoffman 1999; Olson 2000; Sokefeld 2012; Rodriguez-Giralt et al. 2014; Gotham 2016). Put another way, socio-environmental problems often facilitate the politicization of social problems, when new social relations may be forged. Politicization entails "a discourse that acknowledges the traces of power and exclusion and makes these visible, thereby opening particular demands or a particular framework to ideological contestation and democratic debate, and consequently, the space for democratic and effective social change" (Maeseele 2015:47).

Importantly, the particular ways in which socio-environmental problems are governed may also constrain or limit the emergence of new ideas, meanings, and relations. Interaction orders of experts, for instance, consist of interaction obligations—commitments to particular sets of values and assumptions that constrain the re-imaginative possibilities. While interaction obligations can at times defy and resist broader social systems, those inherent to dominant systems help explain why, even in politicized social problems, dominant ideologies and practice endure. As I show in my analysis, key interaction obligations within communities of experts create tensions with newly recognized narratives and meanings. These tensions limit the degree to which cohesive, collective meanings can be produced, thus also limiting the extent to which trust conditions may be met.

Gieryn's (1983) statement on boundary work—another example of an interactionist analysis of scientific and expert knowledge—is instructive here. Boundary work refers to processes of determining legitimate (scientific) knowledge, in part by juxtaposing it to illegitimate knowledge, thereby gaining authority on behalf of the scientific or expert actors whose knowledge falls within the bounds of legitimacy. Other scholars have expanded on this notion in analyses of

the politics of knowledge, showing that scientific and similar institutions maintain authority over social problems in part by (re)drawing these boundaries to reflect their interests (Latour 1993; Jasanoff 1990, 2005; Daemmrich 1998). We can understand politicization as the breakdown and re-constitution of interaction orders in ways that are attuned to issues of power and exclusion. This suggests a broadening of the groups whose sensibilities and commitments are reflected and recognized in the interaction norms of a particular setting—and indeed in the reconstruction of the types and scopes of boundaries around legitimate knowledge.

3.1.3 Trust and Politicization in Sociologies of Expertise

Sociologists and scholars of science and technology have conceptualized expertise in multiple ways. For instance, expertise may be inherently political and serve as socially constructed labels which communities struggle through and over, technocratic mechanisms for depoliticizing social problems, or sets of embodied and tacit rules pertaining to specialist communities. While not always mutually exclusive, these different characterizations of expertise signify different relationships between trusted authorities and politicized social problems.

Literature on risk conflicts often points to contrasting interest groups who use scientific or other forms of expertise to justify policies and actions—suggesting that politicization is due to public mistrust. Epstein, for instance, explains lay expertise as the important experiences of lay people that often contradict or conflict with expert sensibilities. Giddens (1990) presents a similar case in arguing that lay publics lose trust in expert systems when they perceive experts to conceal the truth of risks or deny the existence of risks, signifying the presence of mistrust alongside a multiplicity of experiences regarding a risk. Walsh (1987) calls this a legitimacy crisis whereby publics openly challenge experts' decisions. Wynne (1996) offers an important caveat to this

discussion in suggesting that open contestation of experts' decisions may not reflect a newly unaccepting public; but rather that these sentiments are merely newly expressed. While conceptualizing expertise differently, Eyal (2019) makes a similar case that the politicization of scientific issues works in a dialectical fashion with widespread mistrust of scientists and experts. In these accounts, politicization of social problems and mistrust go hand-in-hand.

Literature from the post-political tradition makes the case that expert-led governance processes serve to de-politicizing problems, escalating the asymmetry between various groups' sensibilities of problems (Kleinman 2005; Swyngedouw 2010; Maeseele 2015). Experts, in these critical accounts, serve to de-politicize socio-environmental problems by justifying traditional solutions through appeals to the authority and objectivity of scientific and other expert answers. Value-laden questions like risk tolerability, the distribution of responsibility, and possible futures are hidden and ignored as environmental problems are managed via specialized engineering and technocratic solutions. While disasters and risk may engender new meanings and relations, the socio-cognitive boundaries constructed by institutions and actors with power constrain possible social responses (Halternmann 2012). In this reading of expertise, politicization may well serve to build trust—but research has tended to focus on empirical processes that do the reverse (undercut trust while also de-politicizing problems).

Collectively, the literature shows how expertise serves intermittently to either politicize or depoliticize public issues, depending on contextual factors over which experts themselves also exert influence. Figure 3 offers a simple heuristic to make sense of these possible relations.

Figure 3. 2x2 Heuristic for Possible Relations between Trust and Politicized Problems

	Politicized	De-Politicized
Mistrust	*Conflicting Sensibilities*; Risk Conflicts	*Socially Distant Technocracy*; Post-Political
Trust	*Expanded Sensibilities*; Negotiated Expertise	*Non-Complex Problem Solving*

A few contextual factors shape how expert-public interactions facilitate trust and politicization. First, the location of knowledge construction is important, with local ties to knowledge production shown to increase trust between publics and experts. Publics might find experts more credible when their authority is bound to local knowledge sources and institutions (Wynne 1989). In addition, experts may be trusted if they have the correct credentials and alliances. Geschwind (2008), for instance, makes the case that scientists are often thought of as an interest group concerned with governance. If scientific authority is coupled with governmental authority, then, trust in scientific experts might depend on trust in government. Finally, the perception of transparency tends to mean publics view expert's advice as more credible and trustworthy, though this is contextualized by factors such as uncertainty and ambiguity of risks and knowledge. There is a recognized tension, for instance, between building awareness of a problem and full disclosure of information. While transparency often facilitates trust, the recognition of uncertainty or ambiguity of knowledge may limit this trust if it causes the public to lose faith in experts' abilities (Kettle and Dow 2016).

My own analysis sheds light on what I call negotiated expertise, which describes processes in which the rules and nature of expertise are negotiated through expert-public interactions in ways

that facilitate trust. I use the term *negotiated expertise* to describe the process where communities with divergent sensibilities collectively construct new meanings and uses of expertise—thereby re-constructing interaction norms that facilitate shared meanings, commitments, and obligations (i.e. producing new interaction orders). This implies that the tacit rules of expertise in a particular context have yet to be firmly established—something I show to be important in connecting politicized problems with trust. This builds on Krick's (2015) use of the concept negotiated expertise, in which the term negotiated refers to multiple actors arriving at joint decisions via informal, deliberative, and consensual procedures. Krick and others (e.g. Maasen and Weingart 2005; Strassheim 2008) have developed this concept with regard to 'hybrid' expert advisory committees that include stakeholders from academic, technical, political, business, and other social arenas.

In the case of Miami's SLRC, the socio-environmental problem of sea level rise is highly politicized. What is also present, perhaps unexpected given the tendency to find mistrust alongside politicized problems, is a trust-building process. While limited by key interaction obligations of the expert committee, a greater level of trust is indeed facilitated through expert-public interactions. The question of how expert-public interactions facilitate trust, then, may be recast as: under what conditions does the politicization of a socio-environmental problem facilitate trust between experts and the public?

3.2 Methodology

To investigate how and why this expert institution is used in ways that broaden meanings and possible solutions, I employ a methodology that focuses on the sensibilities of relevant actors as well as a triangulated look at the processes and contexts involved. By focusing on actors' sensibilities, I foreground how they make sense of the problem of sea level rise and the role of the SLRC in developing solutions—allowing my analysis of negotiated meanings to be grounded in the words and stories of those involved. Further, I look toward documentary and observational evidence as means to build a complete picture of the processes and contexts in which these actors interact and construct meaning.

Though not a direct application, my methodology is reflective of Clarke's situational analysis model, which foregrounds how "social worlds and subworlds or segments come together in a particular arena and why" (Clarke 2005:110). Fundamentally, this approach seeks to map out particular discourses and 'positions' within broader situations, a strategy and goal at the heart of this paper. I follow Clarke's lead in using maps to depict—and analyze—how different discourses in a particular social arena are produced, the important actors involved in particular worlds, and the relations between these actors and discourses. While Clarke has detailed three kinds of maps (situational, social worlds, and positionality), I implement only a social worlds map, which "lay[s] out the collective actors, key nonhuman elements, and the arena(s) of commitment within which they are engaged in ongoing negotiations, or mesolevel interpretations of the situation" (2011:554). As will be seen in the following section of the paper, this is a helpful tool to make sense of who, and in what contexts, particular discourses are taking place.

I implement three primary data-gathering techniques: qualitative document analysis, in-depth interviews, and non-participant observations. Documents include memos, notes, and minutes

from the Sea Level Rise Committee's workshops and meetings, found both online and by request from the City of Miami, and range in time from October 2015 through December 2018. This includes twenty-one public meetings, ten workshops, and two occasions when the committee presented their findings and resolutions at city commission meetings. Most meetings have both agendas and minutes, though a few only have agendas. Minutes often include presentations given by committee members and/or invited speakers on topics relevant to managing sea level rise: the feasibility of living shorelines, ideas for resilient architecture, the science behind salt-water intrusion, the effectiveness of pumps, etc. I analyzed and coded the roughly 2,100 pages of reports to identify: how expertise is defined, how sea level rise is defined and framed as a problem, the prioritized goals and solutions, and how these shifted over the development of the committee.

In addition to documentary analysis, I conducted interviews with past and current members of the Sea Level Rise Committee as well as relevant community members. As part of a broader study on climate governance in Miami, I conducted thirty-one open-ended interviews with key stakeholders, including policy makers, activists, academics, industry leaders, and community residents. Nine of these interviews were with former or current members of the Sea Level Rise Committee and are the focus of this paper.[4] Committee members were contacted via email with an explanation of the research study and asked if they were willing to be interviewed. Nine of the fifteen past or present members agreed to interviews.[5] The other five members were unable to be reached or did not agree to my interview request. Interviews focused on process questions and

[4] Interviews with non-committee members are used for contextual information.

[5] Additional members have been added to the committee following the end-date of this study and were not asked for interviews.

sense-making questions. I asked committee members to give an account of how they came to be on the committee, the goals and functions of the committee, their reflections on how well the committee is meeting these goals, and their surprises, successes, and frustrations in serving on the committee.

Finally, I observed three public committee meetings from September to November 2018 and use secondary data from a collection of sources, including media coverage and government reports, to contextualize and corroborate data. My study would have been strengthened by observations of all public meetings and especially of the committee's internal workshops, as these would add interesting interactional data. However, the accounts from committee members serve to buttress my limited observations by adding reflections on and accounts of these interactions.

3.3 Context of Miami's Sea Level Rise Committee

Sunny-day flooding occurs when high-tides push salt-water from the ocean through the porous, limestone earth and through storm and sewage drains, resulting in flooded neighborhoods. The colloquial term 'sunny-day flood' captures the unique problem of floods that occur without rain. This phenomenon is often attributed with raising awareness of climate change in the Miami area, as it offered direct experience of an otherwise vague and distant problem. This is seen as an impetus to start various city-wide responses to sea level rise. As one committee member put it, "if there ain't flooding, there ain't complaining" (ID#215102018, Oct. 2018).

One of those responses was the establishment of the Sea Level Rise Committee. The City of Miami established the Sea Level Rise Committee in October 2015 as a municipal committee

responsible for studying sea level rise and the risks it poses and guiding city commissioners by recommending policies and possible solutions. The committee largely plays an advisory role with no structural authority over the city's management of climate risks. Members were appointed by individual city commissioners in what was described as a circumstantial selection process, with commissioners choosing scientists, engineers, real estate personnel, and attorneys who they both knew of and who lived in their district. Often, this was based on referrals from other commissioners or their appointees.

One committee member who was not an original member perceived this as informal and haphazard process:

> Each commissioner had a certain number of picks and then I believe there are some at large picks that maybe the mayor could pick. Then there were some Commissioners that might have had to re-pick because I think the idea was that they tried to distribute the expertise. So it just depended who commissioners knew about, and I'm on it because I'm friends and colleagues with someone who was on it (ID#13092018, Sept. 2018).

The original committee consisted of seven members and as of December 2018 consisted of nine members, with a total of fifteen individuals sitting on the committee at some point (through early 2019). The initial committee was made of a land use attorney, two environmental scientists, a politician, an architect, a developer, and an emergency management professional. The lone woman on the committee was an environmental scientist, and the majority were Miami natives or long-standing members of the community. In September 2016, the committee added a biologist who served as an expert advocate for vulnerable, low-income communities. In early 2017, a marine biologist and a businessman joined the committee as original members trickled out. In 2018, a

marine physicist, a neurobiologist, an atmospheric scientist, and an architect—three of whom are women—joined the committee, leaving the committee with five men and four women to end the 2018 calendar year. The neurobiologist filled a second seat for expert advocates of vulnerable, low-income communities.

3.3.1 Multiple Experiences and Sensibilities of Sea Level Rise

In Miami, varying socio-historical circumstances mean different experiences and ways of interacting with sea level rise, and thus different meanings of it as an environmental threat. Historical urban-environmental processes have shaped, and continue to shape, the ways climate risks are experienced. Extensive development of swamplands has led to a decreased ability of the Everglades eco-systems to regulate and counter devastating harms. Dredge-and-fill and draining practices have facilitated growth and development along risky flood plains while simultaneously depleting barrier islands, mangroves, and swamps that could otherwise slow down or lessen impacts from flooding, sea level rise, and warming temperatures.

In addition, the extremely high valuation of land in proximity to water has had serious ramifications for the spatial organization of social groups. Like many US cities, Miami has been segregated along racial and class lines through both formal and informal practices. This has extensively shaped the spatial-demography of Miami, with neighborhoods having strong ethnic and cultural identities.

Over the course of a century, segregation and boundary-making processes have led to a few important outcomes. First, as Miami developed and boomed, people flocked to this place with tourist appeal while indigenous communities, such as the Miccosukee and Seminole Tribes, were displaced, fleeing further inland into what is now known as the Everglades. Second, waterfront

properties have tended to be highly valued and are typically homes for wealthy homeowners. Third, land further from the bays, river, and ocean have tended to house ethnic minority and low-income communities. This includes Haitian, Cuban, and other communities who have migrated from Caribbean and Latin American regions, as well as African-American communities, many of which have been historically disenfranchised and displaced from highway development and urban renewal processes.

As sea levels rise, areas that have traditionally been undervalued and neglected have become hot commodities to developers looking for safer places to invest equity. Communities who have made their homes in the poorer and infrastructurally disenfranchised parts of town now live in places that are being highly valued for urban development and renewal projects. Three neighborhoods in particular—Little Haiti, Overtown, and Liberty City—sit on higher ground in relation to surrounding neighborhoods. Overtown and Liberty City are both historically African American neighborhoods that were gutted from the development of a highway, and were heavily impacted by urban renewal practices in the late 20th century. Little Haiti is a largely immigrant community of people from, or with ancestry tied to, Haiti, Jamaica, and other Caribbean nations.

Little Haiti is home to a controversial Magic City development plan that seeks to spur economic growth and development in the area, led by a large development company with casinos in the area. Most of these developments adhere to smart growth principles, seeking higher density and walkability. Yet, community activists point out that residents are rarely included in design processes and these objectives often result in projects that clash with community values and histories. As one interviewee noted, it is the same groups spearheading these development projects that have historically been implicated in development projects that led to segregation and

displacement. The failure to rectify or address this fact may be contributing to the communities' hostility toward contemporary development projects.

3.3.2 Climate Gentrification

In recent years, property values in these neighborhoods have increased dramatically, leading to what many refer to as climate gentrification and displacement. Questions regarding the causal mechanisms and definition of climate gentrification can and have been discussed elsewhere (e.g. Keenan et al. 2018). My concern lies with how communities construct the meaning of sea level rise and climate risks more generally, and so my interest centers on narratives of climate gentrification.

In Miami, discussions of climate gentrification have largely stemmed from environmental and social justice community activist organizations. These groups explain that climate change and sea level rise are threats given the impact they will have on people's ability to remain in their home communities. As developers and real estate companies look toward these neighborhoods as increasingly valuable places to inject financial capital, the market values of their homes go up and large-scale capital investment projects abound.

This may facilitate displacement in four ways. First, some economically disadvantaged residents are willing to sell their homes and property at cut-rate prices when approached by developers. Many of the families and homeowners are struggling to make ends meet. When a development group approaches them to sell their property for hundreds of thousands of dollars, the immediate offer is tempting even if the market rate is double the amount.

Second, many residents in these neighborhoods are renters who have no control over their property. It is common for landlords to simply stop renewing rental contracts to situate their

property to be bought out by a large developer. Moreover, some of the residents are living in homes with no legal contract or deed, being easily evacuated by the city when a bank sells the rights to a developer or a developer files for foreclosure.

Third, living in these neighborhoods may simply become too expensive for property owners. As surrounding property values go up, property taxes follow suit. For some families, this increase is the difference between affording to stay and taking a check from an interested party.

Fourth, these new developments can cause phenomenological displacement, where residents remain in place yet feel a loss of their sense of place. This type of displacement is a result from new and different demographics and ways-of-life entering a community, breaching local interaction orders and causing instability in residents' lives.

In sum, the story told of climate gentrification reflects mechanisms attributed to displacement from gentrification writ large. It emphasizes an environmental framing that is usefully translated into calls to action and recognizable patterns of responsibility and blame. The issue of climate gentrification has become an identifiable rallying point for Miami's activist community, with activists using climate gentrification as a discursive tool to unify issues around jobs, environmental hazards, and housing. Moreover, it offers a platform for community groups to organize behind when confronting institutions such as the Sea Level Rise Committee.

3.3.3 Divergent narratives: Knowledge, scope, responsibility, and priorities

There are stark differences in how members of Miami's low-income communities experienced sea level rise and dominant narrative produced from the outside of the SLRC. For instance, while many residents experience sea level rise as part of a broader threat of climate change that makes day-to-day conditions more difficult and uncertain, the committee focused on

threats to broad economic stability and growth. In part, this is due to the overwhelming influence of members of the development industry in the original formulation of the committee. While scientists and emergency personnel had seats at the table from the start, the original discourse was often directed by the chair (a land use attorney) as well as the architect and real estate development professional. These professionals, too, must deal with higher temperatures, more frequent flooding, and the possibility of losing their homes. Yet, economic and social capital affords this group with different sets of possible responses—higher temperatures affect those who walk and take public transit more than those in vehicles, flooding costs will dent rather than submerge the finances of wealthier individuals and families, and displacement from gentrification or inundating waters is a different problem for those who have the means for a week's stay in a hotel or a second home than those who do not.

When characterizing the initial committee's discourse as one driven by industry experts' sensibilities, I do not mean to imply that there was a cohesive or monolithic orientation to the problem amongst the committee. For instance, interviews with committee members who are not part of the development industry showed significant differences in sensibilities even among the original committee members. Further, not all committee members neatly fit into *either* industry or community narratives. However, given the profound influence of those in the development industry in framing and orienting the committee's original work and focus, I use the term 'development industry narratives' to capture the initially prioritized themes and solutions in the committee. I juxtapose this industry narrative with 'community narratives' which are increasingly incorporated into the committee's discourse and actions, suggesting an alignment of meaning, orientations, and expectations. Figure 4 illustrates the key differences in how development industry

experts and community members talk about sea level rise and the role of the committee in addressing it.

Figure 4. Development Industry and Community Narratives of Climate Risks

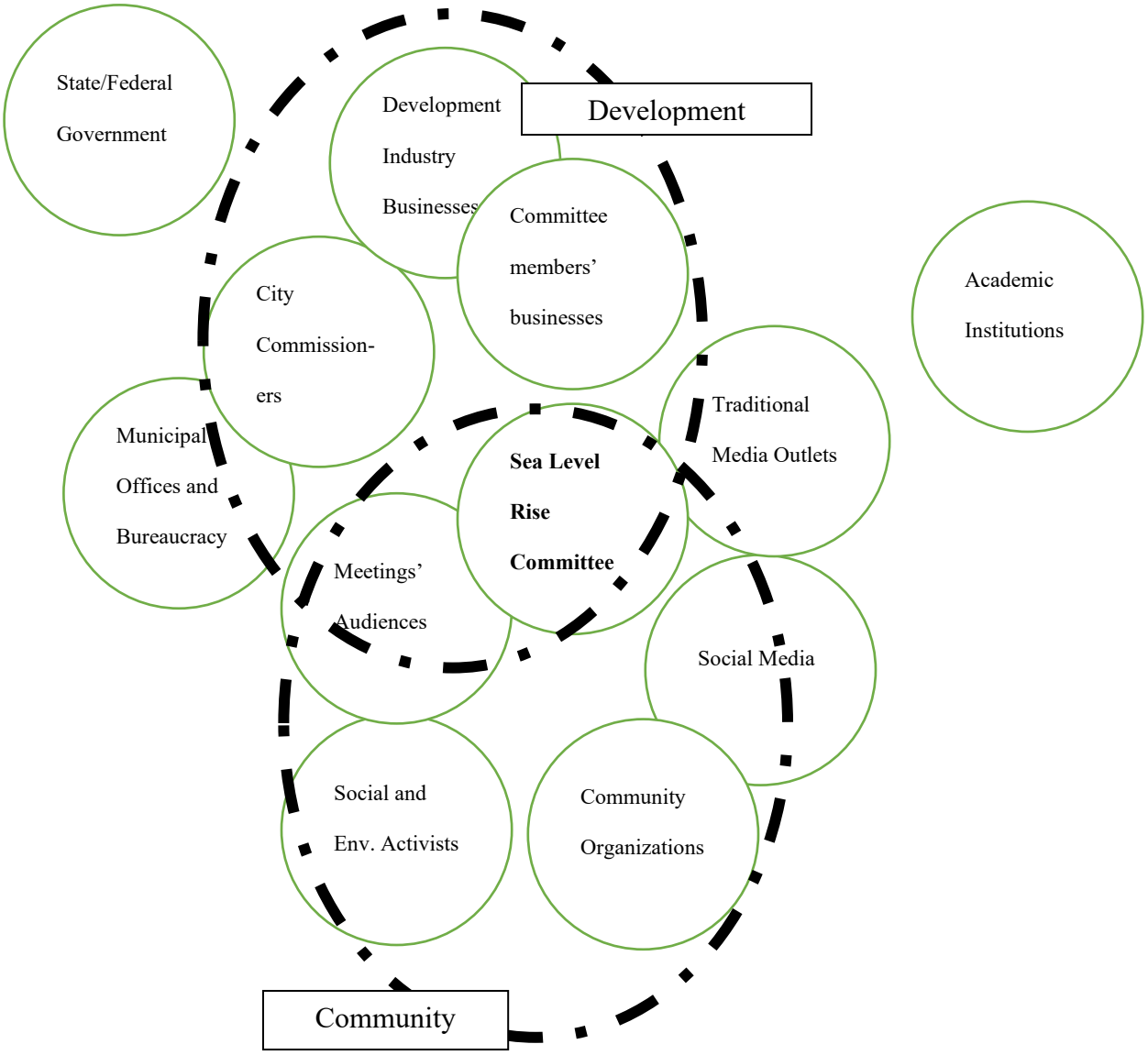
	Development Industry Narratives	Community Narratives
Legitimate Knowledge	Professional knowledge Prefer quantifiable data Outsider knowledge encouraged	Experiential knowledge Prefer lived experiences Stress local knowledge
Sea Level Rise and Climate Change	Refrain from talking about climate change Sea level rise is apolitical Narrowed to physical problems	Focus on climate change Broadened to interconnected problems
Responsibility	Public bears even burdens	Carbon-emitting industries bear extra burdens
Prioritized Solutions	Building codes and land-use planning Insurance policies Hard infrastructure Further studies	Building codes and land-use planning Local tax regulations Social engagement and awareness Further studies

As described in my methodology, I use a social worlds map to help analyze and depict the contexts of these discourses. Figure 5 presents a map of the general arena and smaller worlds in which these discourses and meanings are (re)produced. To add clarity, it is important to note a few important connections and relations between encircled groups. At the heart of the figure, the 'sea level rise committee' sits within the overlap of the development industry world and community world. In general, the closeness between encircled groups represents the magnitude of their

network and interactional ties. The sea level rise committee is made of an array of members who run private development industry businesses (e.g. real estate law firms; architecture firms; real estate development firms), are employed in municipal offices (e.g. resilience, public works), and have strong connections to community organizations (e.g. women's empowerment organization, resilience-building organization).

Further, the committee has close ties to city commissioners, who appointed them, as well as both traditional media outlets and social media. On this last point, it is important to note that committee members typically used outlets such as Twitter in connection with their work with community organizations and activist-oriented actions, while traditional outlets such as local newspapers and radio stations were used to report on the committee's involvement in both types of discourse (e.g. smart growth and resilient design principles as well as efforts to address climate gentrification).

Figure 5. The Sea Level Rise Committee Arena



3.3.4 Alignment in the Committee: Building Community Resilience

While the committee began its work firmly guided by development industry sensibilities, its foci expanded to incorporate community-centered narratives over the year-and-a-half time period under investigation. Given the divergent sensibilities of the problem, this demonstrates that

politicization and trust-building occurred through these expert-public interactions. It is helpful, then, to briefly explain on which grounds the committee facilitated an alignment and convergence in meanings, expectations, and commitments.

First, the meaning of who counts as an expert broadened to include local and experiential knowledge. The original, industry-centered framing of expertise signified "civil engineering; real estate; climatatology, geophysics, coastal management, oceanography, or coastal ocean science; emergency management; and, economics" as the relevant types of expertise to be represented on the committee (SLRC Resolution 2015). Further, language called for 'outside experts' to be procured by the city to recalibrate land use and building codes. These outside experts were to help plan stormwater systems and other infrastructures by adding a business case analysis based on cost-benefit modeling of risk.

In September 2016, the committee's resolution adopted a sixth required type of expertise, specifying that "one member shall possess expertise in advocating for vulnerable low-income communities" (SLRC Ordinance 2016). The second seat for advocates of vulnerable low-income communities was established in the summer of 2018, following an activist's confrontation of the committee—which will be discussed in the next section. Community activists define expertise in relation to people in the community rather than professional disciplines. As put by a committee member, "This approach grounds community experiences…whatever that means, community experiences" (ID#15112018, Nov. 2018). Committee members expressed that these changes resulted in a shift in how the committee talked about the threats of sea level rise.

> We have a range of expertises. I feel now versus when I first came in that the committee is a lot more solid in terms of the range of expertise it has. I feel we

have a lot more people now who focus on resilience and building communities. (ID#13092018, Sept. 2018)

It wasn't that they were explicitly against equity, it just wasn't on their radar or something. So it's in the discussion now, and hopefully it will continue or they will at least be receptive to people who come in and bring issues to the table. (#ID215102018, Nov. 2018)

While the committee initially focused on insurance, finance, and physical harm to infrastructure, these new voices led discussions on community livelihoods, particularly on issues of housing and public health.

Second, the scope of the committee broadened to include discussions of climate change more generally and a focus on community resilience. From the first committee meeting, members expressed the value of being called the sea level rise committee rather than the climate change committee. They suggested that climate change was too political an issue to accomplish anything and working to address sea level rise was more manageable because it was a fact.

We don't have to go there; because, sea level rise is a fact…It's trackable. It's measurable…And, we don't have to discuss and get into that political—it's clearly an issue that is non-debatable.

[The city council] named it the Sea Level Rise Committee.

That's our mandate and our mantra (SLRC Minutes, Dec. 2015).

One scientist on the committee explained the need for a broader approach. He suggested that the committee was spending too much time on adaptation measures geared toward solving problems of new development and old infrastructure. Updated building codes are great because they produce safer buildings; however, he explained, without addressing the underlying issues,

they would only be band-aids. He compared fixing sea level rise to a leaking sink. You can tape up each hole you see water coming out, but if you don't turn off the faucet then it will be a lot of wasted energy, money, and time. Other committee members also explained:

> My working definition of resilience right now is the ability of communities, whatever communities, to adapt. We won't be resilient when it comes to sea level rise before independent communities talk to each other. Because it's so rapidly shifting, you're chasing cheap rent and moving to a different neighborhood every year (ID#11122018, Dec. 2018).

> So, people know, generally speaking, what the problems might be—but they might not understand day-to-day experiences. People literally can never keep their neighborhood from flooding until, you know, somebody wants to buy a property or raise your property because they want to build that high rise—and then people get flooded out (ID#15112018, Nov. 2018).

This shift was recognized by committee members, as put to me by two scientists on the committee:

> They hadn't been cultivating [a focus on equity], but now if you go, they are fantastic and absolutely focusing on how this matters for everyday people…our charge is to identify the scope of work of the committee, and to hear how people fit into every single thing and talk about risk, land developers, and where they are claiming land like in Little Haiti, and the policies that protect those people who live there. (ID#13092018, Sept. 2018)

> This is a shift in who we are actually proactively thinking about (ID#12122018, Dec. 2018).

A key example of this shift is a resolution put forth by the committee to study the possibility and implications of gentrification and climate justice. The resolution, which passed in January 2019, highlighted narratives of community members in Little Haiti, Overtown, and Liberty City, among other areas, they called for the city to investigate the issue of gentrification in low-income, higher-altitude neighborhoods.

> One of the things that I've been really passionate about moving forward is the climate gentrification legislation that we actually have just gotten into recommendation (#ID15112018, Nov. 2018).

> We've now charged the city with a gentrification report, to get back to us on what they are seeing in data and possible solutions (ID#12122018, Dec. 2018).

This resolution focuses on needs expressed by community members and implies the need to investigate who is benefitting from resilience and who is missing out.

This is not to say that no mistrust exists between various publics and the committee. Indeed, levels of skepticism and frustration remain in the relations between community members, the committee, ex-members of the committee, and the city government. Indeed, it would be erroneous to expect or suggest that longstanding mistrust evaporated given positive or healthy relations in one advisory committee. Further, as will be fleshed out in the following sections, important interaction obligations inherent to the committee were important in limiting the degree to which trust was built. This is a point that should be stressed, and one which sets my analysis apart from those which simply look for the existence (or not) of trust. My analysis attempts to better understand how, not merely if, trust is built.

3.4 Building Trust: Emergent and Convergent Interaction Orders

I suggest that two important factors explain why interactions within and through Miami's SLRC tended to facilitate trust rather than widen the sense of asymmetry and mistrust between experts and the public. First, the type of expertise in question was an emergent one. Though an institute for the study of sea levels existed at Florida International University, there were not an obvious perception of who 'counted' as sea level rise experts. As such, the committee lacked strong norms from the outset that may otherwise have limited either public access to the committee's internal workings or the ability for new meanings and expectations to shape the committee's actions and scope.

Second, the existence of advocate-experts helped facilitate trust by bringing the committee closer to the public and the public's experiences to the committee. These two advocacy scientists had their feet in the door of two separate communities—on one hand with the other experts, professionals, and scientists, and on the other the communities on whose behalf they advocated. They used this access to help re-frame community concerns to fit the expert setting while also bringing their expert knowledge to communities in ways beyond the public hearings held by the committee. I explore each of these factors in more detail in the following sections. In doing so, I answer questions such as: How do processes of socializing into expert norms work in an emergent expert setting? How were a minority of committee members able to reframe the committee's vision, goals, and actions? Were they met with opposition by fellow committee members or community members on whose behalf they advocated? My analysis highlights the emergence of interaction orders, and suggests that people who have or gain membership into an order may act as bridges for the integration and synthesis of two sets of meanings, norms, and rules.

3.4.1 An Emergent Problem and Ambiguous Boundaries of Expertise

The emergent nature of this particular socio-environmental problem meant a lack of strong norms in how expert committee members as well as the public made sense of and responded to it. In the absence of firmly established credentials and strong, internal norms, the boundaries of legitimate knowledge, and thus expertise, were relatively open and ambiguous. As one of the primary public responses to sea level rise on behalf of the city, multiple groups with divergent sensibilities of the problem saw the committee as the means to address a newly recognized and experienced problem.

This was demonstrated particularly vividly when an environmental activist confronted the committee for having too narrow of a focus. The activist spoke to the committee during a public comment session at a typical meeting in March 2018. She represented an environmental community organization, the Miami Climate Alliance. Her claims were twofold: the committee was failing to be people-centered and the committee was ignoring broader issues of climate change in its framing of the problem. A real estate lawyer responded:

> We are the sea level rise committee, not the climate committee. I, as the chair, don't want to go outside the four corners…but if we decide we want o take up all climate initiatives in the city, I don't think that's what the administration wants.

A businessman committee member responded quickly, emphasizing that "decoupling climate change as a cause of sea level rise" and "dancing around the issue" was a bad look. He went on, "Yeah, we're the sea level rise committee, but we're the closest thing to a climate committee. We don't have a climate committee." An architect followed, scorning the activist:

> You already called us a bunch of idiots who are wasting our time…if you don't want to listen, just go home and forget about showing up here again, because this is not a climate change meeting…

A politician on the committee then interrupted to calm the escalating voices of the architect and activist, followed by the architect further explaining:

> I don't want to spend an ounce of my energy fighting the polluters, because we are all that. Otherwise, we're hypocrites, because we're all polluters. For you to come here and tell us we need to be focusing on liability of who's created this problem…I think you come here to listen, you get frustrated, I'm telling you the best way to invest your energy is to think about, what is Miami going to do to adapt to the future that is coming to us…not coming here, making us feel we are wasting our time, that we are a bunch of incompetent individuals here, and criticizing the mix and equity balance of the committee. I think you are wasting your time, I don't appreciate it, I personally don't want to hear about that from you (Harris, Miami Herald, 2018).

While one advocate for low-income communities already had a seat on the committee, this event sparked demands for another position which proved instrumental in broadening the committee's focus. This might can be seen by comparing a discussion of low-income communities in November 2016 with the committee's approach in late 2018. In November 2016, a community member brought up the topic of low-income communities:

> Community member: I am also wondering if there is space or opportunity to have—for each motion or for each area of study to have something specific around socio-economic vulnerable communities. I didn't have the feeling, but, I

just always feel like in any conversations I have very little faith that it comes down to low income communities…

> Chair of Committee: This, being our second meeting, it's hard to get everything on our agenda. But, our intent is, at least, from this committee, that everything we do is for the entire community. It's not just for one area. We know, those of us that are sitting at this table that this is going to be something that affects everybody… (SLRC Minutes, Nov. 2016).

By May 2018, the committee revised its initial Resolution for Ordinance to:

> dissolve Sec. 2-1271, the "Sea Level Rise Committee" and establish in its place, The "Resilience" ("Committee"). The "Resilience" ("Committee") is established…to help the City and its residents…adapt to and prepare for the adverse impacts of climate change, including…lack of safe low income housing, lack of food security and undue socioeconomic burdens…with specific emphasis on the City's vulnerable disenfranchised populations (City of Miami SLR Committee Workshop, May 16, 2018).

This mostly demonstrates the politicization that occurred through and within the committee. That this also proved to be a context which facilitated trust needs elaboration, given the noted hostility on display in this particular interaction. In the case of Miami, the differences in sensibilities between the original committee and the community's formulations of the problem and proper knowledge sources were collaborative rather than contradictory. This was explained to me by multiple sources as a process of filling blind-spots—not explicit conflicts. Historical mistrust between low-income communities and the city's power brokers was perceived as a too-narrow

focus on behalf of those in power, rather than outright conflicting interests. An advocate-expert explained to me:

> What technical expertise is required for the committee was the type that had this built-in, it wasn't ignoring a part of their training or a responsibility they had. It was literally just a blind spot (ID#15112018, Nov. 2018).

The difference is an important one, and sets cases like this apart from examples of lay or counter expertises that facilitate mistrust and conflict between groups.

Coverage of the committee by the region's largest newspaper, the Miami Herald, reflects the relationship between the 'newness' of the problem and the collaborative sensibilities of different groups. Alongside twenty-five other Floridian newspapers and the region's public radio station, the Miami Herald launched "The Invading Sea" project, aiming to cover sea level news in South Florida. The collaboration "features editorials from [their] newspaper partners and opinion pieces by scientists, academics, activists and citizens interests in Florida and the threats posed by climate change" (theinvadingsea.com/about-us, Jan. 2019). This new initiative and partnerships meant a new forum for coverage of the Sea Level Rise Committee as well as opportunities for voices to be heard outside the typical local politics columnists.

One example of this dynamic is the Herald's coverage of the aforementioned described incident. The newspaper published two articles in the immediate aftermath of the incident, entitled "Argument between activist and committee member leads to calls for resignation" and "Should Miami's sea level rise committee address climate change, too?" (miamiherald.com, Jan. 2019). However, two months later, the activist in the episode wrote an op-ed for the newspaper lauding Miami's mayor for committing to address "the vital issues that support the principles of democracy and expand public participation in government so that all residents have a voice. His commitment

is to expand the focus of the Sea Level Rise Committee to climate impacts more broadly, so we can begin to calculate costs is also laudable" (Fernandez 2018). This focus on expanded dialogue and deliberation suggests that while the committee was the site of a heated exchange, even those involved in the conflict interpreted the event as one that enabled possible collaboration and enlarged discourse.

3.4.2 Advocacy-Experts: Bringing Communities to Experts, Experts to Communities

I refer to the two advocate committee members as advocate-experts, whom I see as vital in facilitating trust within this politicized context. An analysis of their role in the committee shows that they were able to helpfully translate community concerns into the committee as well as expert framings of the problem into the broader public. Understanding trust-building as a two-way process of aligning meanings, expectations, and commitments is key to this analysis. These experts have access and membership to separate communities with divergent sensibilities of sea level rise as a problem. Put another way, they were part of and had knowledge of two interaction orders

Who were these two advocate-experts? One was an experienced policy-maker and biologist with family connections to Miami who moved to the region specifically to help tackle the issue of climate change. She had a history of community organization and activism, mostly with regard to Latin American communities and women's rights. The other was a doctoral student with admittedly little knowledge of sea level rise who had prior and deep connections to one of Miami's low-income neighborhoods through a community activist organization.

3.4.2.1 Bringing Community Sensibilities to the Committee

First, the advocate-experts were important in reframing community concerns for incorporation into the committee's discourse. This re-framing helped fit issues such as gentrification and equity into the committee's work in ways not achieved through activist interventions during public comments. For instance, whereas the activist who confronted the committee framed her message in terms of direct experiences, the advocate-experts developed processes to translate these experiences into data that other experts were comfortable with. One advocate-expert explained this process in the following way:

> They said they wanted experts and that's what they got. But I don't hear you talking about people. I don't hear you talking about the ways sea level rise will affect communities. So, what are you actually talking about? What's happening here? I feel I might have a decent idea. There was too much focus on economic issues and not enough focus on humans. We concentrated all our assets on Miami Beach, one of the last areas of the city to be segregated---assets originating in a white, rich community. I know you can only get this across if you play respectability politics, being highly educated and being able to conceptualize anecdotal data that can be cited to actually move things forward (ID#15112018, Nov. 2018).

Second, the second advocate-expert chair emboldened other committee members who tended to think about community issues to take a more active and pronounced role in the committee. In particular, the scientists in the room began to show more leadership in devising sub-committees, initiating studies, and offering presentations. The first advocate-expert to sit on the committee explained:

> I feel like when I'm sitting on the committee and sometimes I'm very obvious, I'll roll my eyes. I feel I have responsibilities and when I feel I can't reveal things because of other people, it's sort of like a loan Hawaiian…Now with [the other advocate-expert] I was able to get a bit more comfortable and realizing—okay, I'm never going to know all this stuff, but I can contextualize in the moment and figure out how what I know is happening in communities relates to what they do or what they know and present in data analysis and presentations (ID#15112018, Nov. 2018).

The focus on community resilience also encouraged one scientist to connect his own worries about technocratic measures to community livelihoods. During a regular committee meeting, he gave a presentation about the carbon-emitting impacts of diesel-powered water pumps that could hypothetically lessen the impacts of floods by displacing water. The premise of his presentation, as he explained in an interview, is that there are important value-discussions to be had. In this case, for instance, there was a need to explicitly consider the tradeoff between further carbon emissions and helping communities deal with direct hazards.

The establishing of a sub-committee on marginalized communities proved a useful technique, as it allowed committee members to establish coalitions dedicated to particular community concerns. Further, it institutionalized a community focus into the committee, granting the language of equity, gentrification, and livelihoods regular and explicit space in discussions.

This process was not without hurdles and caveats. While the advocate-experts experienced no outright hostilities toward their involvement in bringing a more explicit community focus to the committee, they did suggest that a few committee members were hesitant to take it seriously. Moreover, the new focus on communities exposed grievances between non-advocacy committee

members, as a businessman who took the community focus seriously began to question the commitments of an architect committee member—indeed, the same two individuals involved in the activist's confrontation with the committee in March 2018. The businessman explained to me that he welcomed the changing framework of the committee, and grew tired of the reluctance of the other member who seemed to resist a broader, structural look at the problem of sea level rise. He called out a conflict of interest with this person, suggesting his business was directly aided by new resilience-oriented development incentives which would propel his business in ways that community focuses would not. The businessman eventually stepped down from the committee, though he continued to support its work by attending public meetings and offering presentations and reports during public comments.

3.4.2.2 Taking Expert Knowledge to the Public

As the advocate-experts re-framed community concerns to address committee blind-spots, so too were they instrumental in taking expert knowledge to the public. I attribute their initiating novel ways of communicating the committee's work to the facts that they were explicitly burdened with advocating for low-income communities and were a part of them. This direct experience meant the advocate-experts knew when, where, and how to bring what was happening in the committee to the communities on whose behalf they advocated.

One tactic was speaking at activist rallies. Social movement communities may be described as diverse groups of actors, organizations, and institutions working toward shared goals and who have overlapping ties, (informal) networks, and memberships to these organizations which sustain and facilitate social movement activities (Buechler 1990; Staggenborg 1998). Miami's environmental activist community consists of the types of community organizations described above who often organize protests, rallies, and other events under the tagline "Climate, Jobs,

Justice." The second advocate-expert drew on her background of community organization in speaking at these rallies. I observed two such speeches, in which the advocate-expert explained the general work of the committee while also inviting the public to put pressure on the committee by attending meetings and contributing during public comments. In causal conversations with members of the public who attended the committee meetings—of which I attended three—I found that at least eight Miamians were drawn to the committee meeting by her speeches at a "Climate, Jobs, Justice" rally.

Another tactic employed by advocate-experts was attending resilience trainings put on by community organizations. For instance, Catalyst Miami holds regular Community Resilience Trainings which aim to bolster knowledge and practical skills to build resilience in the community. Apart from science literacy, this program offers small amounts of funding for community members to initiate projects to help protect against and thrive during floods, heatwaves, and other environmental hazards. Community members have used this training to go on to begin local businesses geared toward small construction projects to help flood-proof properties, art and science literacy projects which teach children and adults about climate change, and a range of tools that help people communicate and organize during floods. Both advocate-experts are involved in this program, joining weekly sessions to teach about the science of sea level rise in addition to using the time to hear community members' concerns.

A third tactic was successfully lobbying the committee to hold meetings throughout the city, particularly in neighborhoods whose residents may find it difficult to make the trip to the city hall. Miami is a dispersed city which covers a large geographical area and whose residents often face barriers traversing around the city. The public transportation system is moderately priced yet slow, making it inefficient for people who only have a limited amount of time to participate in

public meetings. This initiative was first brought forward through the channel of the low-income communities sub-committee, and thereafter was a regular request by participants in public comments. The committee began rotating its location throughout the city in fall 2018, moving from city hall to communities such as Little Haiti, Overtown, and Coconut Grove.

Finally, the advocate-experts, alongside two other committee members, actively used social media outlets—primarily Twitter—to connect work done by the committee to activists' and community organizations' concerns and work. While other committee members and city officials used Twitter primarily to advertise meeting times, locations, and reports, the advocate-experts and likeminded committee members used the platform to encourage climate activism. In part, they did this by sharing interactions on the committee that represent a broadened scope (e.g. when the committee discusses community resilience and/or climate change) and describing them as examples of climate activist-inspired actions. Framing the work of the expert committee in these ways strengthened the rhetorical ties between activist communities and the committee, building and showing an alignment of commitments.

3.4.2.3 Tensions with Expert Interaction Obligations

As the advocate-experts facilitated the broadening and alignment of meanings and expectations, this trust-building trend was limited by extant interaction obligations of the expert committee. While it has been stressed that the committee lacked strong norms, three notable exceptions slowed the trust-building process.

First, bureaucratic red tape was expressed as an annoying yet necessary requirement. In particular, 'sunshine laws' which were written to limit corruption in government slowed the committee's work as they were prevented from having informal meetings without notifying the public. One committee member put it this way:

> There's a bit of a learning curve to learn how to not be corrupt. We're not allowed to talk to other committee members either in person or phone or email or anything outside of publicly announced meetings…to make sure nothing weird is happening. But that makes being efficient really hard, it just inherently seems difficult then to do new things, or to do things quickly (ID#13092018, Sept. 2018)

Another committee member explained:

> A few out of the box ideas fell apart because they needed too much coordination with non-committee members. I remember we tried to have more millennial input, but millennials are super tech savvy—we want to shot text messages, use WhatsApp groups, and others are having trouble signing out of LinkedIn. But then the committee needs us to plan so far ahead, it prevents us from getting a lot of enthusiasm from spontaneous meetings (ID#18202018, Oct. 2018).

This millennial committee member recommended updating the sunshine laws to help build more dynamic interactions, suggesting to incorporate video and conference calls that could still be made transparent through recordings.

In addition, the committee's relationship with the Miami's municipal administration was one of skepticism. Whereas community members expressed original unmet expectations and flawed commitments to the committee, the committee expressed similar unmet expectations and flawed commitments to the city council and mayor's office. At one meeting, a newly appointed city manager came to address the committee. He offered encouragement and assurance that the city was taking the committee's work seriously. His address, however, was met with a skeptical response by the committee's chair. The chair explained that in the past the committee had struggled gaining access to the city commissioners, most of whom seemed to downplay the importance of

the committee. This, in fact, shaped the inter-workings of the committee, as explained to me by two separate committee members:

> There's a very conservative way of thinking about a lot of things. People, I think, are somewhat siloed and are not within the influence of new innovative ways of thinking which would be helpful—and getting the attention of people making the decisions is not easy. It's hard. We have limited access to the commissioner's we do have the ear of (ID#113102018, Oct. 2018).

> Well, you know, part of the reason some of the committee members have downplayed the importance of community experiences is they don't think initiatives like this will make it past the city commissioners. As much as we might care, some are thinking pragmatically about what can we spend time on that will actually do anything—and, that tends to mean things like building codes, worrying about insurance (ID#215102018, Oct. 2018).

Finally, a tension exists between the expert committee's preference for STEM knowledge and the inclusion of community perspectives. While the two advocate-experts indeed had connections and experiences with the communities on whose behalf they advocated, it is important to note that both were trained as professional scientists. For instance, neither advocate-expert was a native Miamian. Commitments to including local knowledges and experiences seem limited by firmer commitments to people with credentials in graduate school education in scientific fields.

3.5 Conclusion

What can we learn from this case study about trust and politicization? The major lesson, I suggest, is that politicized social problems need not come at the expense of trust between different groups. Rather, the politicization of problems may indeed foster trust-building in certain contexts. Here, the presence and actions of advocate-experts suggests one possible process for the successful alignment of meanings and expectations between experts and the public. Other mechanisms could surely be found in further studies of expert-public interactions in environmental and other social problems. Further, the emergent nature of the problem at hand seems to shape the relationship between trust and politicization, as newly recognized problems may well have more open and ambiguous boundaries of expertise that can be (re)constituted in new ways given a lack of strong institutionalized and bureaucratized norms.

The third and final article continues to analyze local sensibilities of climate risks in Miami, but includes analysis of Rotterdam to compare how actors in each place operationalize the concept of resilience in responding to these climate risks—namely sea-level rise. Like the first article, the third explores how broad and ambiguous concepts (the Anthropocene, and now resilience) are used to categorize and give meaning to environmental problems and governance. Unlike the first article, though, the movement of meanings and sensibilities from Rotterdam to Miami will be the primary analytic focal point.

4.0 From Rotterdam to Miami: Symbolic Models of Resilience as Facilitating the Traveling of Climate Adaptation Ideas

The resilience paradigm has emerged as a dominant framework within which communities contend with changing and dynamic risks—environmental and otherwise. Resilience emerged as a concept in ecological sciences in the 1970s and 80s to model equilibrium and balance in natural ecosystems (Holling 1973; Holling 1987; Conway 1987). More recently, the concept of resilience has been combined with social sciences to analyze the interactive dynamics between human and ecological systems (Norgaard 1994; Berkes et al. 2003; Anderies et al. 2006; Perrings 2006). An amorphous and fluid concept, resilience is typically used as a way of orienting toward risks, with the orientation briefly summarized as managing stressors and bouncing back from shocks to ensure stable (social) systems. This study makes the argument that models of resilience constitute symbolic resources which communities draw from in responses to environmental threats. Further, these models facilitate the movement of environmental adaptation ideas and practices from one context to the next, leading to similarities across these different locales. At the same time, the paper shows how local actors construct models of resilience based on these different contexts and in response to the kinds of problems which they see as solvable or manageable through the paradigm of resilience. The paper draws on interview, observational, and documentary evidence in a comparative qualitative analysis of the traveling of water management ideas and expertise from the Netherlands to Miami, Florida, which occurs in the context of Miami's effort to respond to the long-term threat of sea level rise and other climate change risks. In particular, the paper examines

how Miamians and the Dutch construct local models of resilience and how these processes shape the traveling of Dutch practices and ideas into Miami.

The Dutch have come to be viewed as the global leader in water management practices, including climate adaptation and the management of flood risks (de Bruijn et al. 2015; Fainstein 2015; Restemeyer et al. 2015). They are especially prominent within the resiliency network of industrial, governmental, and civic actors who seek to manage climate risks. This network is defined by transnational organizations such as the Rockefeller Foundation's 100 Resilient Cities, which use the paradigm of resilience to frame and respond to risks at a local level (AID 2014). It is in part through these kinds of networks that Dutch practices and ideas have influenced Miami's responses to the newly recognized threat of sea level rise.

As researchers of traveling ideas have shown, ideas which spread from one place to another require local actors to translate, interpret and edit them to fit their particular situation and purpose (Sevon 1996; Djelic and Sahlin-Andersson 2006). This sentiment is expressed in the statement that "ideas left in books left on shelves do not travel, and no amount of satiation will help to diffuse ideas from closed libraries" (Czarniawska and Joerges 1996:23). The present paper further develops this literature by highlighting a mechanism which facilitates the localization of traveling ideas: cultural cognitive *modeling* processes. These model responses facilitate the ways in which local actors seek out, translate, and implement the resilience paradigm.

The local actors relevant to this study are largely industry professionals, community leaders, and governmental workers, and the scope of who is most directly involved in constructing the relevant cultural cognitive models is largely limited to those with claims of expertise relating to the environmental problems in questions. This is particularly true in the Netherlands, where industry and governmental water management experts play a centralized role in the adoption of

the resilience paradigm. In Miami, some of the forums through which models are constructed are open to and involve the lay public; however, actors with claims of expertise dominate both the terms of discourse and the practical implementations of resilience.

Miamians largely interpret and act upon the problem of sea level rise and related flood risks by operationalizing the concept of resilience. This is to say, resilience has become a primary category for interpreting this particular environmental threat. One significant symbolic marker used to designate ideal resilient solutions is that they come from the Dutch. The Dutch, in other words, have become a symbol of ideal water management-related resiliency that lends legitimacy to certain ideas, projects, and policies. At the same time, the process of negotiating what 'the Dutch' may represent in the context of resilience is dynamic, as actors have different accounts of why the Dutch have become global leaders of water management and climate adaptation. Thus, the kinds of resilience-building activities which can be meaningfully cast as inspired by the Dutch are fluid.

This study is divided into four parts. First, I use a cultural cognitivist framework to introduce modeling as a key mechanism in the traveling of ideas, contributing to the organizational sociology and human geography literatures previously mentioned. The second part describes the methodological approach to the case study and the data sources analyzed. The third part charts the ways that Miamians and the Dutch came to recognize resiliency as a solution to different types of problems in relation to water-related climate risks, and the different forums and institutions through which models of resiliency are constructed. Finally, I discuss how the Dutch model of resilience travels to and influences Miami's resilience-building practices. Miamians symbolically conflate 'resilience' with 'Dutch success,' and while the exact meaning of Dutch success is subject to negotiation in Miami, this conflation shapes how Miamians make sense of the possibilities of

resilience. I argue that the traveling of ideas is facilitated by symbolic models, as community sensibilities and ideas come to be represented by and built-in to the models which are adopted and adapted in new locations. This marks the importance of understanding both the localizing of ideas as well as the sources of meaning attributed to those ideas. This highlights the role played by cultural cognitive modeling processes in shaping our taken-for-granted approaches to environmental (and other) risks.

4.1 A Symbolic Model Approach to Understanding Resilience and Traveling Ideas

Traveling ideas require local actors to receive, translate, interpret, and adapt them for local contexts. This understanding reflects organizational (Sevon 1996; Djelic and Sahlin-Andersson 2006) and human geographical (Livingstone 2003; Mahony and Hulme 2018) literatures concerning the movement of ideas and knowledge. Organizational research on traveling ideas has identified the useful notions of bureaucratic cultures (Barnett and Finnemore 2004) and organizational discourse (Dostal 2004), which describe the norms, practices, and local circumstances of an organization which is adapting ideas from another organization. These cultural components in an organization's day-to-day operations shape how borrowed ideas are localized. Beyond organizations and into broader communities, human geographers have conceptualized a similar process, particularly with regard to the spread of scientific knowledge, focusing on the cultural, political, and historical conditions in which ideas and knowledge are interpreted in different places (Livingstone 2003; Mahony and Hulme 2018).

4.1.1 The Use of Models in the Traveling of Climate Adaptation Ideas

Researchers have shown how differences in communities' socio-environmental contexts shape the localization of climate adaptation policies (Yamane 2009; Layshon and Geoghegan 2012; Matless 2014; Webber 2014; Weisser et a. 2014). This vein of research often uses of the notion of models adopted and used by local experts to help understand the nature of traveling ideas. 'Models' here refer to an idealized adaptation policy or practice which is "disembedded from its hometown and adopted in other sites…raised in the imagination of planners" (Ong 2011:14). Ong explains that modeling involves both discursive and material practices that reflect some core element of the original application of an idea. However, the movement of policies is not always straightforward. For instance, Webber (2014) uses a comparative case study between Kiribati and the Soloman Islands to explain how World Bank-endorsed climate adaptation policies are mobilized and transferred to new places after successful implementation in other localities. Rather than describing straightforward, off-the-shelf policies, Webber stresses that "policies on the move do not simply transfer from place to place, but instead mutate, morph, and evolve in motion, in unpredictable and often contradictory ways" (2014:29). This can be shaped by the ways local experts make sense of which problems are to be solved by policies (Callon 1986; Ong 2011) as well as what Bunnell (2013) terms 'elite dreaming,' whereby local experts' references to successful applications of an idea or practice in other locations reinforce policy decisions.

The notion of modeling has been shown to help make sense of the global-local connections in traveling ideas. While climate change and adaptation are global phenomena, they occur in specific places. Therefore, climate adaptation behaviors cannot be considered merely as implementations of general global models, nor as purely local responses to changes in precipitation or temperature patterns (Czarniawska and Sevon 2005; Krauss 2009). Mahony and Hulme (2012)

demonstrate what this means by way of the transfer of climate adaptation technologies from the Global North to the Global South, arguing that technology transfers facilitate hegemonic responses to climate adaptation which may be inconsistent with local understandings of socio-environmental relations. Bravo (2009) and Rudiak-Gould (2012) further demonstrate this point by showing how local adoptions of climate science models are often adjusted in popular discourse to make room for local orientations to the environment.

This policy-mobilities literature broadly conceptualizes models as blueprints which can travel and be adopted by local communities. That is, the relevant 'models' here are pre-formed policy prescriptions, practices, and ideas which are altered to fit new locations. I suggest that conceptualizing models as blueprints of pre-existing policies or practices to be adopted is limited in its ability to explain how models come to be recognized and used as models in the first place. By assuming a pre-existing model, analysis is limited to the application of those models, making sense of localization in terms of the model's ability to fit local contexts, rather than why local actors sought out those models in the first place. Further, this conceptualization does not account for the important ways that the construction and use of models in one location can impact that of another.

4.1.2 Cultural Cognitive Modeling: A Symbolic Model Approach to Traveling Ideas

I suggest using the framework of cultural cognition to further develop the notion of modeling in traveling ideas. A cultural cognitive approach makes use of several of the aforementioned insights while providing a basis for understanding how and why particular models are constructed, as well as how the making of a model in one place shapes the policies and practices of another. It does so by grounding the notion of modeling in community sense-making practices.

This approach motivates us to understand models as produced and rooted in communities prior to the traveling or adoption of specific policies and practices, rather than mere blueprints which may be picked up and adopted by those communities. The cases considered in this paper illustrate the value of the cultural cognitive approach, as it helps make sense of the differences between Dutch and Miamian localizations of resilience, as well as how Dutch conceptions of resilience end up influencing Miami's practices and policies. In the remaining parts of this section, I elaborate on the approach and explain its relevance to traveling climate adaptation ideas.

Cultural cognition refers to a collective sense-making process where individuals' perceptions and actions are guided by shared categories and concepts, and by the meanings attached to them. Stemming from the work of Douglas and Wildavsky (1982) on the cultural elements of risk perception, this theory suggests that people make sense of risks according to culturally relevant predispositions (Kahan and Braman 2006; Kahan et al. 2007). Cultural predispositions include iterative categorization processes through which communities construct relevant markers and structures that individuals use to interpret everyday information, such as who is credible and trustworthy (Earle and Cvetkovich 1995) and appropriate hierarchies of values (Kahan et al. 2015). A fundamental claim of the cultural cognition approach is that we experience the world through collectively constructed categories, and that our sensibilities, decisions, and behavior are thereby influenced by them. This approach has been applied to understand ways of classifying the world into discreet parts (Zerubavel 1991), giving meaning to particular groups, activities, or concepts by 'marking' them in relation to their unmarked counterparts (Brekhus 1996; Mullaney 2006), as well as developing individual identities in relation to groups (Lamont 1995; Schnoor 2006).

Within this framework, models can be defined as collective heuristics used to establish desired goals or visions for the future which correspond to socially constructed categories for interpreting the world—such as the resilience paradigm. Models are constructed in local communities through a variety of interactions whereby actors construct and maintain the appropriate categories of interpretation vis-à-vis a particular social problem. These models are constructed based on shared categories of meanings, conceptualized as heuristics for thought communities (Fleck 1979) to perceive and organize relevant and normatively approved paths forward. The root of these different mechanisms lies within perception, and the ways in which we interpret, coordinate, and arrange our perceptions (e.g. which categories or labels we pay attention to versus those we ignore). It is the constellation of categories of meaning which makes a model, depending on how a particular concept or category is put in relation to other sources of meaning. For example, in the Miami case, Miamians interpret the problem of sea level rise through the prism, or category, of resilience. Miami's resilience 'model' prioritizes the problem of sea level rise and is further shaped by the ways that local actors give meaning to resilience in relation to other relevant factors—such as climate change and governmental capacities. Together, this constellation of meanings is mapped onto ideal futures in managing the problem of sea level rise, articulated via the resilience paradigm in discourse and practice.

4.1.3 Symbolic Models of Resilience as Facilitating Climate Adaptation Ideas

What would a symbolic model approach look like with respect to local implementations of resilience? Similar to work on climate adaptation, scholars have sought to understand how the idea of resilience translates into practice according to local contexts. These analyses have focused on resilience in relation to topics such as migration and refugee crises (Paul and Roos 2019; Anholt

2020), urban infrastructure (Gressgard 2019), and climate change and sustainability (Cote and Nightingale 2012; Welsh 2013; Simon and Randalls 2016; Collier and Cox 2021). However, while sometimes making reference to resilience as a 'traveling idea' (e.g. Fainstein 2015), this literature tends to focus on the local expression of a presumed transnational idea rather than on the mobility of policies or practices. I suggest there is a need to consider resilience as a paradigm which facilitates the traveling of particular climate adaptation ideas.

Resilience has become a paradigm adopted by many cities and countries as they orient themselves toward climate risks. As mentioned in the introduction, the concept itself emerged first in the domain of ecology with regard to ecosystems' abilities to maintain system functionality in the face of external shocks and stressors (Holling 1973). 'Resilience' has since been used to make sense of the functionality of social systems with regard to a variety of security risks, not least environmental risks. Rather than treating resiliency as a moveable blueprint of possible policies and practices, I understand it as an amorphous paradigm through which communities construct their own models of climate adaptation, thereby facilitating the traveling of particular sets of policies and practices.

The particular ways that communities construct these models depend on the problems perceived as solvable by the resilience paradigm and how resiliency is given meaning in relation to other factors. While it has been argued that resilience is so ambiguous that it risks being "an empty signifier that can easily be filled with any meaning to justify any specific goal" (Weichselgartner & Kelman 2015:249), it is also the case that the resilience paradigm carries substantive implications for managing sea level rise and other climate risks. Most notably, resiliency assumes that environmental shocks or stressors to a social system are inevitable—and that these unavoidable events will produce system changes (Davoudi 2012). The implications of

this may be that any responsibility for preventing such disturbances is withdrawn from states or international institutions (Duffield 2012; Chandler & Reid 2016), such that constructing a model of resilience is an approach which localizes responsibility for coping with environmental threats.

Sea level rise in particular can be understood through the prism of resilience as a system 'stressor' rather than a shock. This is an interesting problem to contend with, as it is a long-term and relatively abstract one. However, sea level rise poses shorter-term problems as well. Long before complete inundation, rising sea levels will worsen hazards such as tidal, rainfall, and storm-surge flooding, exacerbating risks by pushing groundwater toward the surface and increasing the magnitude of water held at bay by dikes and dams—ultimately meaning more lives lost, harmed, and disrupted by flood events and other hazards (Masson-Delmotte 2021). In addition to these direct physical harms, rising sea levels put more and more stress on water supplies, sewage systems, energy sources, and other critical infrastructures (Masson-Delmotte 2021). It has been shown that the resilience paradigm has typically been used to motivate policies which aim to mitigate short-term harm rather than encouraging policies that amount to substantive or structural changes (Carmin et al. 2012). As such, it is worth exploring how both the Dutch and Miamians use the resilience paradigm to respond to the threat of sea level rise, and how these models of resilience give priority to short- or long-term factors.

A final point on the symbolic models of resilience relates to the forums where models are constructed and the particular types of actors involved in their construction. In the context of expert-led governing processes and multi-layered institutional contexts of managing environmental problems, we should understand these forums as existing across multiple scopes and scales. Forums range from local, face-to-face interactions to regional media coverage to transnational summits. The construction of shared concepts and meanings should not be

understood as monolithic or exhaustive of any individual's private commitments or beliefs. Rather, the construction of shared concepts is piece-meal, dynamic, and shaped by a multitude of actors in multiple spaces of interaction. Cultural cognitive theorists have coined the term "cognitive battles" to describe these contexts where communities must negotiate between alternative frameworks of meaning (Zerubavel 1997:12; Brekhus 2003; DeGloma 2015). This will be reflected in Miami's implementations of resilience. Nevertheless, dominant uses of categories do emerge around a particular problem, and it is this constellation of interpretations which guides community-wide climate adaptation practices.

The actors involved in implementing resilience, and thus constructing models based on the paradigm, tend to be people with professional and expert knowledges. Therefore, the construction of resiliency models is consistent with the literature on climate adaption which suggests a prominent role played by experts whose understanding of problems—and whose recognition of these problems as successfully solved in other locations—shapes the localization of ideas. However, it is not the case that the lay public is always marginalized in the construction of local models of resilience. In Miami, where competing models of resilience emerged, one model is largely constructed by environmental activists and community organizations who formulate climate risks primarily as threats to community well-being and empowerment. This is in contrast to the Netherlands, where a singular model of resilience was developed almost exclusively by governmental and industrial actors with expertise in a variety of water management practices. The relevant actors and forums in both cases will be elaborated on in the following section.

The conception of symbolic models of resilience grounded in local understandings of environmental problems and desired paths forward can explain why particular Dutch practices and policies have influence over Miami's resilience-building practices. As will be shown, expert-led

communities in each locale develop unique ways of giving meaning to and implementing resilience. Yet, the Dutch model of resilience comes to have an influence over Miami in interesting ways—and in ways not captured by imagining a blueprint of resilience policies which can be applied across cases. The Dutch model of resilience is explicitly tied to the Dutch as global leaders in water management, and local experts in Rotterdam view the resilience paradigm primarily as a networking opportunity to export their water management expertise. This positioning of the Dutch as the global leader in water-related climate adaptation occurs in some of the same forums through which Miamians construct their own models of resilience. As Miamians come to conflate the notion of resilience with Dutch success in managing water, the Dutch model shapes Miami's resilience-building in two ways. First, Miamians appeal to different reasons and explanations for Dutch success to justify a variety of resiliency actions, setting the terms of the local 'cognitive battle' of resilience around what may be plausibly attributed to the Dutch. Second, Miamians borrow substantively from the Dutch model of resilience, coming to see resilience as a platform to develop and then export their own climate adaptation expertise, primarily to countries and communities in Latin America.

4.2 Data and Methodology

The study utilizes a comparative qualitative analysis to explore local understandings and implementations of resilience, employing ethnographic methods, qualitative interviews, and documentary analysis to investigate two field sites: Miami, Florida and Rotterdam, South Holland. I identified and interviewed key actors who are shaping resilience discussions and decisions in

Miami and Rotterdam, including government officials, industry experts, scientists, policy advisors, environmentalist groups, and residents. I interviewed these actors to understand the narratives of risk and resilience that are developing in local communities. I analyzed local governmental policies and infrastructure projects to determine which groups' narratives are foregrounded and which are ignored in the implementation of resilient solutions. Further, I observed and documented interactions in forums such as discussion panels, conferences, public hearings, commission meetings, planning sessions, community trainings, and similar events to better understand how meanings and assumptions of risk and resilience are justified, challenged, and negotiated.

I regularly evaluated emerging data from fieldwork to reorient my focus on local understandings of key contexts and processes for giving meaning to and enacting resilience. The important processes I attended to were knowledge production, narrative building, and enactment. Knowledge production takes place through scientific studies, evaluations, participatory planning of infrastructure, and resilience trainings. Narrative building takes place in organizational newsletters, media reports, interviews, conferences, and in forums which bring experts together in discourse with the public. Enactment takes place in committees, government offices, and board rooms where decisions are made and actions taken. The lines between these processes are blurry. In many contexts, there are elements of each process—participatory planning, for instance, involves all three processes.

Substantively, *knowledge production* refers to the recognition of the nature of resilience and how it relates to water management, sea level rise, and associated threats. My data illustrates these processes by highlighting the kinds and sources of information used to by relevant actors to make sense of resilience projects. *Narrative building* refers to how these risks and threats are framed, justified, and discursively reproduced. My data illustrates this by showing how a variety

of actors talk about resilience to each other, in observations and documentary analysis, as well as myself, an outside interviewer. *Enactment* refers to official decisions to implement and carry out projects, policies, and programs. My data illustrates this by detailing what is actually being done in the name of resilience beyond its rhetorical use. These processes, too, overlap, such as in decisions to conduct studies on the impact of sea level rise on sewage systems or insurance costs and the communication of these studies to the public.

The particular methods techniques include interviews, observations, and documentary evidence. Interviews allowed actors to give accounts of the importance of the resilience paradigm, how they thought about the climate crisis in general and the threat of sea-level rise in particular, and what they were doing with whom to implement adaptive measures. Observations primarily took place in Miami, centering on the different forums of expert-public interactions. These include planning sessions, training sessions, conferences and lectures, committee meetings, activist rallies, and artist gatherings.

To select and recruit interviewees, I implemented a snowball sampling technique, starting the 'snowball' with Miami-Dade County's and Rotterdam's resilience offices. This method was used to foreground how those in the resilience office made sense of local expertise and what kinds of narratives, stories, and perspectives were important in official responses to sea level rise. With the resilience offices as starting points, I asked interviewees who was responsible for sea level rise related activities, who was particularly knowledgeable, and who was important to talk with to better understand local adaptations. In doing so, I allowed local resilience actors to initially define what and who counted as experts. The interviewee pools grew as I repeated this process with each subsequent interviewee, thus expanding to a locally understood map of important actors, knowledge, and experience in building resilience to sea level rise.

In the case of Miami, I had an in-person meeting with three officials from the resilience office in August 2018 in which I explained the ambitions of my research and started the snowball process. Quite quickly, I learned that the power players in sea level rise adaptation was a small number—with recommendations rarely falling outside a core 15-20 actors. Over the course of four months residing in Miami, this process led to thirty-three (33) interviews, including 5 officials from municipal offices (four from resilience offices; 1 from public works), 6 members of the City of Miami's Sea Level Rise Committee (re-named the Resilience Committee), 2 from the regional water planning authority, 2 artists, 5 environmental activists or community organization leaders, 4 engineers or planners in the private sector, 2 land developers or entrepreneurs, 1 insurance broker, 2 journalists, and 4 university scientists.

In the case of Rotterdam, a Skype call while still residing in Miami served as my starting point, which was followed up by two separate in-person interviews with officials from the resilience office in February 2019. I began to build my Rotterdam snowball sample following these two interviews, using the same process as in Miami. Whereas actors in Miami were quick to suggest a wide range of social actors—artists, journalists, community organizers, activists—as possible interviewees, the snowball in Rotterdam may be described as more densely packed. Rarely did an interviewee recommend someone outside the government's bureaucratic institutions, with exceptions for representatives of housing corporations and engineering firms, by whom I was referred to an activist. Over the course of nine months residing in Rotterdam, this process led to twenty-four (24) interviews, including 4 officials from municipal offices (three from resilience; 1 from water management), 3 members of the regional water authority, 5 members of the regional water board, 1 national government official, 4 engineers in the private sector, 3 university scientists, 1 environmental activist, and 3 representatives from housing corporations.

It should be noted that these labels are used as pragmatic identifications to give some sense of the breadth of actors involved and in fact several of the interviewees could have been tagged with a number of the labels. For instance, members of Miami's Sea Level Rise Committee are also either scientists, engineers, developers, emergency personnel, or attorneys—some of whom worked in the resilience office and thus are counted as officials from the resilience office since this seems to be their more vital role. While a few possible and recommended interviewees were not interviewed because of a failure to contact, refusal, or some other circumstance, I maintain that those who were interviewed offer a solid accounting for the types of people local experts view as particularly knowledgeable or important to resilience-building efforts.

The August 2018 meeting with Miami's resilience office also paved my way into many of the aforementioned forums of expert-public interactions. The office accommodated my wish to observe resilience in practice by inviting me to watch and participate in trainings, workshops, and planning sessions. It is within these forums that the meanings and applications of resilience are largely enacted, communicated, justified, and re-imagined. While this observational analysis largely focuses on Miami, comparisons with Rotterdam are drawn to highlight important similarities and differences in cultural, economic, environmental, and political contexts. However, the analysis remains rooted in Miami, in part because these emergent forums of expert-public interactions were rare in Rotterdam.

Documentary analysis was conducted to triangulate and corroborate accounts in interviews, but also as a unique data source to better understand how environmental problems and possible solutions are framed, communicated, and represented. Documents range widely and include media coverage, government reports, organizational newsletters, social media activity, and scientific studies. The most relied on documents include newsletters and reports from both Offices

of Resilience, which had the purposeful aim of defining resilience and informing the public of actions being taken under its guise. Media coverage of resilience-building activities also proved useful, particularly the reports which included interviews with the same actors which were interviewed for this study.

In what follows, I use the aforementioned data to detail how models of resilience emerged in Rotterdam and Miami, followed by an analysis and explanation the influence of the Dutch model in Miami.

4.3 Constructing Models of Resilience in Miami and Rotterdam

4.3.1 Emergence of Resilience in Rotterdam

Nearly twenty percent of the Netherlands is land reclaimed from the sea. A quarter of the country lies below sea level, and nearly sixty percent is prone to flooding from rivers or the sea (Netherlands Environment Assessment Agency [KNMI] 2009). Much of this is in the state of South Holland, where the city of Rotterdam is located. The lowest elevation point in the Netherlands, just north of Rotterdam, is over six meters below sea level. Yet, given a topography seemingly built to be vulnerable to sea level rise, Rotterdam and the Dutch have 'risen to the top' in adapting to climate threats and sea level rise in particular.[6] The city and region are

[6] 'Rising to the top' is a phrase found in many journalistic pieces about Rotterdam's ascendance to being a global leader in climate adaptation (Kimmelman 2017; Nicholls-Lee 2019).

internationally lauded for successful flood-risk adaptation, and the Dutch continue to provide aid in the form of hired and freely given engineering expertise to other countries in climate adaptation efforts. South Holland is adding sand to beaches to fortify coastal protections, designing urban spaces to catch and store water in times of excess rains or floods, developing floating infrastructures, and continuing to raise and strengthen dikes (Delta Programme 2021). Insurance regulations and physical infrastructure are designed to protect residents from 1-in-1,000-year disaster events, and Rotterdam is currently projected to have the capacity to withstand up to two meters of sea level rise (Delta Programme 2021).

The problem of sea level rise is generally understood in the context of historical experiences of managing water, as opposed to an altogether new crisis, and this shapes the operationalization of resilience as a continuation of the Dutch practice of leveraging water engineering expertise as an economic and political tool. With over a half-millennium of experience in aligning economic industries with state bureaucracy and flood defense systems, the Netherlands has firmly established itself as a global leader in water engineering. In addition to governmental bureaucracies organized around water management, the Netherlands—and in particular the South Holland region—is home to leading technical universities and private engineering firms which focus on water infrastructures. These domains of expertise have pushed Rotterdam to the forefront of the resilience movement.

In 2016, the Rockefeller Foundation approached the city of Rotterdam to be its model-city for water-related resilience, establishing the municipal Office of Resilience. As a representative from the Office of Resilience explained in response to a question about why Rotterdam aligned itself with the Rockefeller Foundation:

> We actually did not have plans to join up with Rockefeller until they approached us. They initiated the partnership with the city, explaining they would want us to be part of their network to serve as sort of the blueprint for how other cities might develop water resiliency. We of course were happy to join, because we can see the value in spreading our knowledge but also in learning from what others are doing in aspects other than water issues (ID#12022019, Feb. 2019).

The governmental institutions primarily responsible for the management of water risks are the national Water Ministry (*Rijkwaterstaat*) and the regional Water Boards (*Hoogheemraadschappen*). The Water Ministry is responsible for the day-to-day maintenance and upkeep of dikes, waterways, and water-related infrastructure. The Water Boards are responsible for assessing risks from storm-surge and rainfall flooding as well as creating regional medium- to long-term land-use planning to facilitate water safety. As the oldest democratic institution in the Netherlands, Water Boards are notable for their reliance on elected officials who, along with appointed engineering experts, make decisions around taxation to fund the infrastructural upkeep overseen by the Water Ministry.

Experts in both of these organizations talk about resilience and sea level rise in similar ways as the above-quoted member of Rotterdam's Office of Resilience. This is to say, resilience as a concept does not add particularly new ways of making sense of water-management; nor does the threat of sea level rise. As a civil engineer from the Water Ministry explained to me:

> We have plenty of projections for how much seas will rise over the next few years, or even the next twenty or thirty years. But actually, we just do not know with enough confidence what happens after, say, 2050. And so rather than trying to guess now, we develop plans for the next thirty years that can, if needed, be

> extended on and adapted to fit either less or more extreme scenarios for sea level rise. It really is a problem for another day. For now we need to deal with only a small increase (ID#11842020, April 2020).

A separate engineer said the following when asked how the adoption of the resilience concept changed organizational behavior:

> If I am honest with you, it does not change. We are spending our days and most of our time developing reports, carrying out assessments. It is not something that fundamentally changes our work or how we do it. Maybe fifty years from now the work looks different. But our strategies for keeping flood defenses strong still require us to do the same types of strength and risk assessments of dikes, or for instance we still are mostly involved with contracting out the actual work involved—and even the groups we give contracted work to are the same as ever (ID#11942020, April 2020).

A third engineer addressed the problem of sea level rise, again noting that the problem does not facilitate new ways of engaging in risk and water management:

> My work really is the same. Of course, the Office of Resilience has brought in perhaps more attention to issues of climate change, but really not much changes for us. We still go about assessing water quality issues and areas where maybe we should develop spaces differently. The fact that sea level rise is happening does not give us much different scenarios, we are already under water! (ID#11832019, March 2019).

In fact, one engineer from the Water Board which includes Rotterdam in its scope explained that the Dutch approach to water risks should not be considered resilience in the first place.

> Rotterdam, and actually the Netherlands, are one of the least resilient places. Not that we are not prepared for quite some changes to the sea levels, but, in terms of bouncing back or dealing with things like floods or other extreme events, we are not resilient. We are resistant to threats, and extremely resistant actually, but we have no 'Plan B'. Actually, recently, maybe this is funny and shows what I mean. The Maeslant has only been meant to [too?] close once—and, thankfully, it was a false alarm and no storm surge came. But as it was predicted, everyone in Rotterdam and the Hague and Delft and anywhere was trying to flee, to evacuate, but couldn't. There was hours of traffic jams all evening. Had there actually been a bad flood, you had thousands of people sitting still in their cars, some of them in really low points by the river, it would have been terrible. We completely rely on our dams and protections working, because if they do not work, we are in real trouble (ID#13012020, Jan. 2020).

To summarize these accounts, Rotterdammers do not make sense of resilience as a new paradigm of managing climate-related risks. Sea level rise itself is not imagined as a new problem, but as an extension of a centuries-old one, and the resilience concept and associated networks are seen primarily as a new way of developing and exporting status quo climate adaptation methods which are seen as successful. In the next sections, this will be put into contrast with how Miamians give meaning to resilience. In Miami, the day-to-day significance of newly recognized climate risks are more pronounced, offering a context where a variety of actors interested in climate adaptation seek out and view resilience for its potential to serve as a platform for new actions and orientations toward environmental problems.

4.3.2 Emergence of Resilience in Miami

Miami is in a much more vulnerable position than Rotterdam with respect to sea level rise. The United States lacks the centralized, national-level approach to managing water-related risks that is present in the Netherlands, putting Miami and South Florida in a position to manage its own risks without robust infrastructures. Further, Miami does not have a historical legacy of fighting against the sea. While it has always been threatened by tropical storms and hurricanes, the prospect of rising sea levels is a newly recognized threat. Whereas in Rotterdam sea level rise is interpreted as a continuation of an age-old problem of being under water, Miamians tend to see sea level rise as a new threat associated with climate change. This is relevant for Miamians' models of resilience because resilience has been adopted in large part as a response to these newly recognized threats.

Within Miami, there is a dominant model of resilience which is largely constructed by experts within governmental agencies and industry professionals as well as an alternative model of resilience which is formulated primarily by environmental activists and community organizations. Interestingly, it is the work of the latter groups which initially brought the resilience paradigm into Miami, seeing it as a way of increasing community empowerment in the face of climate risks. Community organizations began hosting resilience trainings for the public which focused on improving the self-reliance of individuals and communities at risk of flooding, heat waves, and hurricanes. Particularly relevant are what has come to be understood as 'sunny day flooding' in Miami. Because South Florida rests on a foundation of porous limestone, any rises in sea level have impacts that go beyond coastlines. Sea waters push inland terrain underground, raising underground water tables to the point of flooding low-lying areas. In recognizing these new threats, environmental activists used the language of resilience to call on local and state governments to develop more robust plans to address climate change.

Catalyst Miami, a local NGO aimed at building resilience and raising awareness of climate change, offers the aforementioned trainings for residents on preparing for and adapting to environmental threats. In an interview, one of the leaders of these trainings explained to me that resilience should be defined in relation to the day-to-day experiences of communities dealing with problems such as sunny day flooding:

> Resilience starts with the strength of the community, even before considering weather problems like climate change or sea level rise. Miami has community problems, maybe because it's a transient city, so you have people moving around chasing cheaper rent but then not building strong neighborhoods. So, we developed this resilience training to empower neighborhoods and communities which could use that as a platform to make the changes needed…Resilience has to start with the direct experiences of these communities, not abstract ideas. Communities right now are getting flooded out of their housing, so what needs to be done immediately to address that? (ID#111102018, Oct. 2018).

However, when the concept of resilience was formally adopted by municipal and county-level governments, the model of resilience constructed by those with expert and professional knowledges was foregrounded. Rather than prioritizing community empowerment, a new model of resilience was developed which prioritized the broader economic stability of the region and was heavily tied to real estate development. As such, resiliency became a way of understanding sea level rise as a threat to short- and long-term real estate investments. Even during this shift, though, the emphasis on possibly new forms of governance and action remained.

This shift from community to economic framings of resilience occurred primarily in two forums: the city's Sea Level Rise Committee and the county's Office of Resilience. The Sea Level

Rise Committee—which was renamed the Resilience Committee three years after its founding—was involved in the assessment and long-term planning for threats associated with sea level rise. The committee was given the task of articulating how and why sea level rise would be a problem for the city. As such, the discourse within the committee and interviews with key members highlight what the adoption of resilience meant to local governments. Rather than framing resilience around the day-to-day experiences of local communities, the Sea Level Rise Committee emphasized broader economic concerns, as put by a former member of the committee who left out of frustration of the economic focus:

> Sometimes resilience can be simply a veneer, greenwashing at its best. The kinds of infrastructure projects and other stuff that gets pushed through that get called resilient, they aren't always about being flexible or about building robust systems…which I think is what resilience means. It can tend to be a way to simply get traction for the same sorts of projects that keep [allowing] the most growth (ID#12392018, Sept. 2018).

This sentiment—that the committee was focused more on infrastructure than the social aspects of resilience—is also reflected in the priorities of the committee writ large. The kinds of stressors to the system imagined as most threatening revolved around the ways that climate risks such as sea level rise presented problems for the dominant local industries like real estate development. One committee member, who works professionally as a land use attorney, explained:

> The major threat from sea level rise is what it means for how we build sustainably…and, resilient thinking, whatever that can mean, has to include nimble institutions. And by that I mean new ways of responding to these new problems. So, we have a problem, because some of the areas that attract investment, and have

> for years, now are dealing with higher risks of flooding, and it will be hard to attract decades-long investments. But that's what Miami relies on, so we have to figure out ways of dealing with the insurance costs, of protecting these areas to make them have lower risk-profiles, so that we can continue to attract high-level investors (ID#11112018, Nov. 2018).

The use of resilience to frame new strategies for dealing with the economic concerns was reiterated by multiple people in Miami who work toward resiliency. Other committee members expressed that resilience should be defined as the creation of robust, flexible systems that are capable of dealing with new threats. When articulated into policy preferences and desired actions, this primarily took the form of insurance programs which could aim to incentivize investments in areas which may otherwise lack development due to increasing insurance premiums associated with the higher risks of environmental hazards, as well as the hardening of infrastructure to physically protect these areas.

The Office of Resilience, which was developed out of a prior Office of Sustainability, is involved in the development of infrastructure projects. This primarily involves training local public works departments in how to account for sea level rise in infrastructure planning as well as partnering with the Army Corps of Engineers to carry out a Federally-sponsored 2-billion-dollar infrastructure plan for mitigating climate risks in and around Miami. In addition to this singularly large project, the Office of Resilience also works with various organizations across South Florida, such as The Nature Conservancy, The Everglades Foundation, and local universities to develop and implement smaller climate adaptation infrastructure projects.

In attending the public works trainings, it became clear that the concept of resilience was used to motivate new practices in designing infrastructure. Representatives from the Office of

Resilience would host sessions to teach members of the public works office, as well as related municipal and county offices, how to make use of software to incorporate sea level rise projections into road, bridge, sewage, power grid, and other infrastructural planning. One of the Office of Resilience workers who gave these trainings explained to me how the paradigm of resilience is used in local governance:

> So, when the Office of Resilience was created, my day-to-day job did not change too much, but what did change was the emphasis on working together with different departments in order to design better systems. Probably what this helped with most was just the realization of how threatened our critical infrastructure was, because, it seems crazy but departments simply didn't talk to one another before. So this has helped realize, really, just what was needed as far as training different departments and how to communicate the different needs across the different departments (ID#11892018, Sept. 2018).

These remarks highlight how key actors in Miami's resilience-building see the concept as a way of moving forward with new ideas. In this case, many of the primary duties of what is now the Office of Resilience did not change with the adoption of resilience language.

What *did* change in the eyes of those in municipal offices, though, was the explicit effort to build better communications across departments which led to the realization that an overarching approach to managing climate risks was needed across the various municipal and county departments. When asked about the possible benefits of developing the Office of Resilience, the manager had the following to say:

> It's been easy to understand the framework…finding creative ways to move ahead with action items we'd already tried. The Rockefeller's framework of

> scoping out and planning for the stresses helped translate the sea level rise modeling into impacts. We already had been coming to grips with sea level rise as a real future condition. But we didn't have an organized way of dealing with it. You know, it's not that foreign, but all these issues with sea level rise, like housing and transportation or planning issues…organizing our county's budget around resilience has helped align the different efforts with a cohesive strategy (ID#14112018, Nov. 2018).

The infrastructure project with the Army Corps of Engineers also helps identify how resilience is given meaning. Framed as the largest resilience-building effort in Southern Florida, the project serves to highlight the priorities and meanings of resilience by key actors. The Coastal Storm Risk Management Feasibility Study was a three-year project aiming to study and design solutions to protect Miami from storm surge and tidal flooding. I observed a two-day workshop in the first year of the study, called the "scoping stage," which brought local stakeholders together to discuss the range of possibilities for the project. The stakeholders included the Office of Resilience, a team of engineers from the Army Corps, representatives from relevant city and county departments (i.e. public works, transportation, emergency management, and sewage), and the city planner. An engineer from the Dutch Water Ministry was also invited, through the cooperation of Miami and Rotterdam's Offices of Resilience, to offer advice throughout the process. This will be elaborated on in the following section.

The process began with the Army Corps team leader asking the Miami stakeholders to describe vital areas of importance—identifying areas on a map which were essential to project with the infrastructure project. The team leader explained that the primary justification for developing infrastructure was cost-benefit analysis, where the money spent on infrastructure must

be less than the money they eventually save. Following this main principle, the Miami stakeholders circled hospitals, business districts, universities, and power grids—explaining that erecting many small barriers around economic hubs and places with high levels of real estate equity would be the most efficient use of funds.

4.3.3 Models of Resilience: Climate Change and Governmental Capacity

Rotterdam's model of resilience can be summarized as an avenue to continue the exportation of water management expertise. On the other hand, two competing models developed in Miami: one focused on community empowerment in the face of environmental hazards and the other on broader economic concerns such as real estate investments and insurance regimes. In the section I will focus on the economic-oriented model of resilience in Miami, as it has come to dominate discourse and practice within the expert communities who have the most influence on the operationalization of resilience. The following section, which explicitly outlines Dutch influences on Miamians' models of resilience, will further discuss the community-oriented model of resilience.

Following the cultural cognitive modelling concept, it is important to understand models of resilience by analyzing how the concept of resilience is put into relation to other sources of meaning. Doing so helps articulate the differences between Rotterdam and Miami, as expert communities make sense of key conceptual relations differently given the stark contrasts in their histories and contemporary cultures of managing environmental problems. The conceptual relations most relevant here are the association of resilience with climate change risks and the relationship between resilience and new modes of governance.

The Dutch use of resilience occurs in the context of its centralized water management governmental bureaucracies which have successfully managed water risks for centuries. In this sense, Dutch experts do not see the resilience paradigm as a particularly new or innovative approach to managing water risks. Moreover, resilience is not as explicitly tied to the problems of climate change, as the problem of sea levels is viewed as an independent problem in which climatic changes are simply one factor in the management of water-related risks. Resilience, then, is not viewed as a way of innovating or of re-constructing socio-environmental relation, but rather as a platform to strengthen and continue the status quo—part of which is the exportation of its own expertise.

Miami's lack of governmental and infrastructural capacity has meant that local experts do view resilience as a new paradigm to re-imagine and re-construct socio-environmental relations. In the absence of a strong, centralized national approach to managing water risks, the resilience paradigm offers the Miami community a new avenue to locally manage climate risks. Further, the problem of sea level rise is a newly recognized threat in Miami, rather than an extension of an age-old problem as seen in Rotterdam. Because of this, resilience is seen and used as a method to address the new problem and the associated threats articulated by institutions such as the Sea Level Rise Committee.

Figure 6. Resilience in Relation to Climate Change and Governmental Capacity

	Climate Change	Governmental Capacity	Model of Resilience
Rotterdam	Water management is an age-old problem relatively detached from climate change concerns	Resilience is not a reason to develop new governance measures, as extant governance practices are seen as widely successful	Model of resilience as a continuation of old practices and as a way of exporting these practices
Miami	Climate change, and sea level rise in particular, motivate the adoption of resilience and its application	The lack of governmental capacity and action in relation to water-related risks spurred the adoption of resilience and frame its application in new governance practices	Model of resilience as a way of protecting against financial risks, as well as engaging in new governance practices

4.4 Influence of the Dutch in Miami

Having addressed the construction of different models of resilience in Rotterdam and Miami, this section details the influence of the Dutch model on Miamians' response to sea level rise and application of resilience. Guided by the cultural cognitivist framework, the traveling

aspect of traveling ideas can be understood in terms of how sensibilities of a concept in one place move about and influence other applications of nominally similar concepts. To reiterate, this framework moves beyond the typically understood movement of policy blueprints to highlight the movement of sensibilities and meanings.

The Dutch influence comes about in two ways, each of which is facilitated by local Miamian conflations of 'Dutch' and 'Resilience.' As the concept of resilience comes to share a meaning with Dutch success in managing water risks, the models which are constructed around this paradigm are delimited in ways that reflect Miamians' beliefs about why the Dutch are successful. Put more explicitly in cultural cognitive terms, the category of resilience as a way of interpreting the problem of sea level rise is conflated with the category of Dutch success, which facilitates the kinds of ways Miamians respond to sea level rise.

The symbolic conflation between Dutch and Resilience takes places in the forums in which resilience is institutionalized in Miami (see above). It also occurs in other publicly oriented forums such as summits, conferences, and town halls. It is within these forums that narratives of the Dutch as leaders in water management and resilience are given importance in Miami. Importantly, it is also within these forums that Dutch experts make appearances and contribute to the construction of resilience models. As mentioned, a Dutch engineer from the Water Ministry took an advisory role in the collaborative water infrastructure planning led by Miami's Office of Resilience and the Army Corps of Engineers. Dutch water engineering firms play prominent roles in the annual climate leadership summit, and experts from both government and industry appear at town halls and conferences designed to inform the Miami public on the goals of resilience.

For instance, in 2018, the Annual Southeastern Florida Climate Leadership Summit invited three Dutch engineering firms, which are typically contracted by the Water Ministry to plan and

implement infrastructure projects, to present their services and innovative technologies—centering on software to be used for assessing climatic impacts on infrastructure development—to local governments in Miami. The two-day summit, which is designed to bring together thought and practice leaders in the space of climate adaptation and mitigation, was headlined by three representatives from the Dutch Water Boards in the final plenary session on the role of governance in addressing climate change. In this session, the representatives—one elected official and two engineers—presented the history of the Water Boards to explain how climate adaptation relies on a strong governmental connection to the public as well as to the industries which are developing innovative water management strategies. The take-home message was that the Dutch have come to be models for resilience against climate threats because of this central role of government in fostering innovation.

In analyzing how Miamians themselves talk about the Dutch, it can be seen that this message equating the Dutch with resilience is typically accepted and reproduced in discourse around sea level rise and climate risks. An engineer who has collaborated with the Office of Resilience in smaller infrastructure projects explained, "the Dutch are a different culture, a sort of collectivism that isn't here, and are on a different rock for instance, but there is still so much to learn from them…because what they are doing is working and they are doing fairly well." (ID#115102018, Oct. 2018). In a monthly meeting open to the public in November 2018, an architect on the Sea Level Rise Committee responded to a resident's criticism that there was no hope in addressing climate change by saying, "Just look at the Dutch. We're far behind, yes. But we need to be doing what they're doing—they're showing there is a way of dealing with these problems. It isn't hopeless." (Personal Observation, Nov. 2018). Someone with an advisory role

for the South Florida Water Management District suggested it was Dutch confidence that can be learned from:

> You know, the Dutch, I think, are remarkable for how confident they are in their preparedness. I don't know how much they really are, but they definitely act and talk as if they're prepared. And, thinking about resilience, especially urban resilience, just the level of commitment to looking at new science, incorporating it into planning, it's remarkable. Beyond the engineering, you know? It's about the confidence to say, yes, we can manage this problem, and we'll commit enough resources to do so (ID#13122018, Dec. 2018).

The notion that the Dutch should be listened to and copied has indeed taken root in Miami. This has two important impacts on the ways that models of resilience are constructed and implemented. First, it frames the parameters of the cognitive battle between community- and economic-oriented resilience, as proponents of either approach make appeals to Dutch success in arguing for particular implementations of resilience. Second, the substance of the model itself is borrowed in Miami, as actors come to see the possibility of developing a resilience industry and then exporting this expertise to places which will deal with similar environmental problems in the future. Both of these influences show that Dutch sensibilities of resilience travel—that their locally produced model has impacts in other locales.

4.4.1 Framing the Cognitive Battle between Community and Economic Resilience

In appealing to Dutch success to motivate and justify particular resiliency actions, Miamians must make sense and tell stories of why the Dutch are successful. These stories of Dutch success are used to define the goals of resilience, as resilience-building shares a meaning with

being like the Dutch. Miamians are aware of the contextual differences in ecology and governance which make it unrealistic to simply transfer Dutch practices and policies, and so also articulate how these goals of resilience matter for the Miami context. They do, however, have competing ideas for what should be learned from the Dutch, and thus how lessons from the Dutch may be adapted to Miami. Referring to the articulations of these differences as a cognitive battle does not suggest that the actors are necessarily hostile or engaged in an explicit fight, but rather that competing meanings have developed and must be negotiated by these actors.

Proponents of the economic-focused model of resilience often appeal to an explanation of Dutch success rooted in technological innovation and industrial development. Their story of Dutch success emphasizes the robust infrastructure of the Netherlands and the role of technical universities and water management firms in the innovation of new water management technologies. Two members of the Sea Level Rise Committee, a developer and an architect, two engineers working in the private industry in Miami, as well as the manager of the Office of Resilience have been the most notable proponents of this framing of Dutch success. The architect on the committee suggested:

> If we want to follow the Dutch, just look at what they've done in terms of building resilient buildings. This idea of making room for water, developing buildings and public spaces in ways that catch the excess water but also can be used in other ways when there are no floods. Producing more of these buildings is the most immediate type of action we can take, incentivizing this kind of building in our land use policies (ID#18202018, Oct. 2018).

The engineers elaborated on the kinds of technological achievements which have led to Dutch success:

> Well, if you look at the Dutch, it's no surprise they're always being talked about if you look at the kinds of innovation. It's a high priority in the universities, and those universities are so connected to the actual industries. It's not just the simple dikes and dams, but really advanced technologies that measure water, displace water, even a lot of artificial intelligence and computer engineering going into it (ID#127112018, Nov. 2018).
>
> It probably won't happen, but I heard some idea of the Dutch building an entire dike stretching across the sea, a complete barrier. Who knows if it'll get the kind of investment, but the people who came up with it, serious people in universities and working already on other projects. That just isn't happening here, that that level of commitment to huge technological solutions (ID#125112018, Nov. 2018).

The developer on the committee and the manager of the Office of Resilience offered ideas for what this kind of vision of Dutch success might mean for implementing resilience in Miami. The developer explained:

> What we should do, and what we're working on, is developing the same kind of collaboration between the private industry—developers, architects, engineers, anyone working in this sort of build infrastructure business—and universities and the government. The Dutch call this the triple-helix, and it's what we need if we want to not just solve some problems right now but make Miami what we're calling the future of resilient cities…it's not enough to maybe fix a flooding issue here or there, but we have to be committed to developing a resilience industry, a proper industry that just isn't here at present. Sure, there are a few firms

who specialize in resilient buildings, but we need it across the board (ID#113102018, Oct. 2018).

The manager of the Office of Resilience shared a similar vision:

> What we're trying to do here, with this office and by building resilience, in part it's the short-term things like building water pumps and seawalls and raising critical infrastructure…But, more than that, we need to develop a community of resilience, a commitment to resilience thinking across our private sectors where this is the norm for Miami, where when people think of Miami, they think of a thriving resilience industry (ID#14112018, Nov. 2018).

Whereas the story of Dutch success told through the technological achievements of the country emphasize the development of Miami's own resilience industry, those who stress the community-centered aspects of resilience tell a different story and motivate different priorities. While they also appeal to Dutch success, they focus on Dutch governance methods. The actors note that the governance methods cannot be strictly applied to Miami given the differences in water management responsibilities, the lack of a strong centralized state, and the absence of a collectivist culture which is present in the Netherlands. Yet they use this story of Dutch success to justify applications of resilience which foreground democratization of environmental decision making. Notable actors who appeal to the Dutch in this way are representatives from community organizations such as Catalyst Miami, two members of the Sea Level Rise Committee representing vulnerable communities[7], journalists and artists, as well as a geologist at a local university. Unlike

[7] While it is outside the scope of this paper, it is worth commenting on the committee positions dedicated to representing vulnerable communities. The committee members do not represent particular neighborhoods per se, but

their counterparts, this group often explicitly talks about the deficiencies of the technologically oriented stories of Dutch success when articulating their views. This may be because this governance-oriented view tends to be marginalized in terms of the officially endorsed policies and actions taken by local governments in pursuit of resilience.

One member of the Sea Level Rise Committee, who has a history in environmental activism and policy making, summed up this view:

> People here always talk about the Dutch, and they aren't wrong that they're better prepared than us. But I think they sometimes miss the point, because the Dutch have a long history in this, it isn't new to them, and they've developed these kinds of governmental institutions that can actually respond to big problems…if

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were appointed to act as a voice for low-income and historically marginalized groups in general. In practice, though, the focus of these members is on communities in Little Haiti, Overtown, and Liberty City. Little Haiti is one of the poorest neighborhoods in South Florida, and is home to generations of immigrants primarily from Haiti and the Dominican Republic. As a neighborhood which rests on slightly higher elevation, the neighborhood is undergoing what many residents refer to as 'climate gentrification.' See Kiefer (2021) for a broader discussion of this issue. Overtown and Liberty City are predominantly African-American communities, the result of segregation policies through the 1950s which designated Overtown, originally called Colored Town, as the allowed place of residence for black Miamians. In the 1960s, when a highway was built through the middle of the neighborhood, many residents relocated to Liberty City. With histories of receiving little in terms of public services and governmental protections from environmental damages, residents in these communities are the primary participants in programs which aim to increase community self-reliance, such as Catalyst Miami's resilience trainings that focus on individual and collective strategies to protect and prepare people and property for a variety of climate and weather-related risks. The committee members who represent these communities aim to voice these experiences which highlight different immediate and material concerns than the broader economic focus of the dominant resilience model.

there is any lesson to take, it's that we need a government that is accountable for tackling environmental problems (ID#11122018, Dec. 2018).

The idea here, elaborated on in the rest of the interview, is that the Dutch should be imitated not for their technological prowess, but for their governmental institutions which have water management deeply embedded in them. While the historical circumstances which gave rise to these institutions in the Netherlands are not present in Miami, they are still seen as things which can be copied. Further, it is not necessarily the institutional structures which should be copied, but the ideas grounded in them. Further articulating this sentiment is a local journalist, who explained:

> …just because we don't have something like the Water Boards doesn't mean we can't come up with ways of having responsive governments. And I think that's really what we should be focusing on with all of this resilience stuff. We're not going to have our government organized around water, probably not, but we can learn the lesson of having the government be responsible for managing climate change in ways that are informed by people (ID#119112018, Nov. 2018.)

A geologist from the University of Miami also talked about the meaning of resilience and how it might be related to the Dutch history of water management:

> Cities can't be resilient. They can't. Because they can't move—and if adaptation requires moving, then, well, a city just can't. Communities can be resilient, and that's how we should think about resilience. You asked about the Dutch, and I'll say from what I know, what I've seen, the stuff about Dutch infrastructure is perhaps not what is useful for us. Sure, it's well developed. But for us, what we can learn is the ways that they purposefully bring democracy into their

> environmental decision making. It can't just be unaccountable engineers (ID#1592018, Sept. 2018).

How this idea could be put into practice in Miami was explained by a representative of Catalyst Miami as well as a program manager at the CLEO Institute, which is an NGO dedicated to raising climate change awareness in the Miami area:

> …and I was just at a town hall last week where the message was learning from the Dutch, but it was all about these engineering firms the Dutch have and the crazy infrastructure projects they've built and how we need to bring in Dutch firms to learn from. Well, maybe. But, if anything, we need the kind of public involvement in decision making. Maybe it can't work the same way, but we can use the idea of democratic decision making…for things like planning infrastructure, or designing resiliency plans or figuring out what to do about sea level rise (ID#12892018, Sept. 2018).

> Well, if I had to pick out one thing to implement resilience, it's actually nothing technically to do with climate change. It's the idea that people know what they need, know what kinds of challenges they face, and so we should listen to them more—if we are going to be resilient, okay, we need to figure out ways of making people heard who are actually dealing with these problems (ID#14102018, Oct. 2018).

Interestingly, these attempts to specify why the Dutch are successful, and then in turn use these success stories to motivate particular applications of resilience, often decouple what ought not be decoupled. Dutch success in managing water risks should rather be explained by necessarily connected governmental and infrastructural capacities. The centralized strategy of governing water

risks allows for the funds, via taxation, as well as the buy-in, via democratic election, necessary for competent experts to innovate, build, and maintain the required technological tools.

Moreover, given the conflation of resilience and Dutch success, the point made by the Dutch engineer emphasizing the resistance—not resilience—of the Netherlands is largely overlooked. In both the industry-centered and community-centered approach to resilience in Miami, the possibility that the Netherlands may not be a model of resiliency after all is typically ignored. In some cases, the community-centered approach to resilience as articulated by groups such as Catalyst Miami significantly diverges from the Dutch emphasis on withstanding hazards through technological control of the environment, given that it emphasizes community autonomy and capacity in coping with immediate environmental hazards. The conflation of Dutch success and resilience, then, can be interpreted as one motivating factor for giving preference to the industry-centered view while relegating the community-centered view to questions of governmental responsiveness rather than qualitatively different techniques in managing risks.

4.4.2 Borrowing the Idea of Exporting Resilience Expertise

Beyond using the conflation of Dutch success and resilience to frame the negotiation between community- and industry-centered ideas of resilience, Miamians borrow the notion of resilience as an opportunity to develop and export expertise. This avenue of Dutch influence highlights that the notion of traveling ideas should be understood as more than blueprints of policies, as it is Dutch particularities of the concept of resilience which can be seen to travel in this case. Miamians are aware of the Dutch legacy of exporting water management expertise, and actors involved in resilience-building make this explicit, as expressed by a member of the Office of Resilience:

> Well, I'll tell you something I've been thinking about recently, is that we've been borrowing Dutch expertise for about ten years now. And so have so many other places. And it occurred to me, this isn't an accident. It's no accident that it's always the Dutch—because they push out their firms, their expertise really well. So, maybe what we can actually do is figure out a way of developing our own expertise that we can do something like the Dutch have been doing for so many years (ID#12122018, Dec. 2018).

A developer on the Sea Level Rise Committee saw this connection directly related to the use of resilience:

> I think for us, when we have a resilience office and are making resilience plans, we're trying to make pathways to manage all these sorts of problems. But for the Dutch, look at what they are doing. They're involved in our resilience plan, they're always at and hosting climate conferences, I think Rotterdam is hosting the resilient cities conference next year. They're capitalizing on this idea that people should ask for their advice and help (ID#113102018, Oct. 2018).

In recognizing the Dutch use of resilience to further their exportation of expertise, Miamians seek to copy these initiatives within their own context. In some ways, this further supports the development of a resilience industry which is the focus of Miami's dominant model of resilience. As shown in the previous section, some resilience-builders in Miami appeal to the 'triple-helix' format which is popular in the Netherlands as a way forward in developing this expertise in their own backyard. The same developer, who has been involved in many resiliency projects in Miami, explained plans to develop this resilience industry:

> It's a ways away, but we're getting started. We have an idea to purchase a huge piece of land just outside of Miami and make it the center for resilience—not just in government, they're doing that, but a place where we can bring businesses together who, you know, are maybe resilient architecture firms or use resilience in environmental restoration. But to have a place to connect what can be a resilience industry, and connect them to universities, too, so that we have people coming out of school ready to be entrepreneurs in resilience (ID#113102018, Oct. 2018).

While recognizing that a flourishing resilience industry is perhaps years away, Miamians are already looking toward the future for where they will export this expertise-to-come. In particular, they have eyes toward Latin America and the Caribbean as fruitful markets. In the fall of 2018, Miami's Chamber of Commerce and Office of Resilience partnered to host a Town Hall session dedicated to this idea. The speakers were a representative from the Office of Resilience, a hydraulic engineer from one of the Netherlands' largest engineering firms, and a Miami architect whose firm specializes in resilient buildings. The Town Hall was marketed toward business leaders and entrepreneurs whose work in some way touched on aspects of resilience. Latin America and the Caribbean were talked about as locations that are already confronted—or will be confronted in the future—with the same sorts of climate change problems that Miami is currently experiencing. In building a robust community of resiliency experts to manage these problems, Miami businesses will have the required experience and expertise to then be useful to other communities.

While strategy of utilizing the resilience framework as an opportunity for Miami to grow and export expertise may not be solely explained by appealing to the Dutch, the Dutch are a clear source of justification and motivation for these thoughts and actions. As such, the Dutch model of resilience as an avenue for exporting expertise should be interpreted as an idea which travels

through the sensibilities of both Dutch and Miami resilience-builders. This is to say, what is traveling is more than simple policy instruments and policy blueprints. The ideas which travel are at least in part the ways in which concepts are given meaning as categories of interpreting and acting on relevant problems.

4.5 Conclusion

Resilience is an amorphous and ambiguous concept which must be given meaning by relevant actors for it to be applied to social problems such as climate change and sea level rise. The ways in which actors in Rotterdam and Miami do this depends in large part how the idea of resilience is understood in relation to local understandings of the problem of climate change and governmental capacities in managing environmental problems. Rather than starting with pre-determined notions of what counts as resilience, this study has shown that local actors construct models of resilience based on these different contexts and in response to the kinds of problems which they see as solvable or manageable through the paradigm of resilience. Rotterdam's model of resilience comes to fruition, in the sense that the networks and connections made through the resilience paradigm foster the borrowing of Dutch ideas and expertise in Miami. Within Miami, this Dutch influence plays out in two main ways: it frames the cognitive battle between community- and industry-oriented models of resilience, and it is substantively adopted my Miamians who seek to build and export their own climate adaptation expertise.

This study contributes to literatures on resilience by showing how the concept is given meaning according to local contexts and sensibilities. This should help us better understand how

academic concepts shape action and behavior once popularized and institutionalized in local settings. Primarily, this study builds on literatures on traveling ideas by introducing a theoretical approach to traveling ideas that foregrounds the traveling of meaning-making and sensibilities. This broadens the notion of traveling ideas beyond policy blueprints and could be fruitfully applied to a host of ideas beyond resilience, climate change, and environmental sense-making. Future, research might focus on the multiple directions and pathways of traveling sensibilities and meaning. For instance, introducing a third community which also borrows Dutch ideas and comparing these processes to the Miami context would help articulate the local circumstances relevant to the localization of ideas. A second option would be to study how ideas emerging out of two locales have reciprocal influences on one another; in this case, how ideas and meanings generated in Miami in return influence Dutch thoughts and practices.

5.0 Concluding Remarks

The articles in this dissertation have shed light on important and relevant questions regarding the cultures and politics of environmental knowledge. The two main themes throughout the articles are the ways in which actors give meaning to environmental problems and the nature of authority of particular sensibilities and knowledge-claims. A primary claim throughout the dissertation is that the relevant meanings of environmental problems are largely facilitated through discursive practices which categorize the world into discreet chunks of information. While concepts such as the Anthropocene and resilience offer particular opportunities and parameters which can shape how actors make sense of broader problems, factors such as political interests and cultural histories in turn shape how actors give meaning to these very concepts. In other words, while the language and nominal paradigms we use to articulate environmental problems matter for how these problems are understood by offering possible categories of interpretation, they only matter within the particular contexts of why actors view them as important and how they view them in relation to extant categories of meaning.

The second issue taken up in these articles centers on questions of authority of knowledge. In the introduction, questions were raised such as: how and why are claims about environmental changes seen as credible, who has authority over environmental knowledge, and what role does expertise play in determining whose and which ideas matter? Each article offers insights into these questions, showing that the source of authority has implications for the kinds of solutions to environmental problems which are imagined and entertained. By re-basing the nature of scientific

authority, the Carnegie Museum aimed to expand the scope of their own authority into explicitly political terrain. Actors in Miami embraced the notion of expertise as a determinant of credible and authoritative perspectives as a strategy for bringing alternative sensibilities into environmental governance. Finally, the Dutch reputation for authoritative knowledge in water management facilitated not only technical approaches to climate adaptation, but also the sensibilities of the Dutch in terms of operationalizing the resilience paradigm as a way of expanding exportation of adaptation technologies.

As expressed in the conclusions of each article, there is ample opportunity to continue this line of reasoning and research in future projects. Indeed, doing so should be seen as particularly relevant given the degree to which communities at local, regional, national, and global scales are attempting to make sense of and respond to sweeping environmental changes. A focus on local sensemaking will continue to help understand these processes by highlighting how environmental problems are given meaning and how those meanings interact with relevant authoritative institutions. Perhaps most importantly, this will contribute to our understanding of the possibilities and constraints of imagining novel socio-environmental relations and systems of governance.

Appendix A

Table 1. Qualitative Interviews

ID#	Role	Affiliation(s)	Date	Location	Format
18112017	Guest Curator	Carnegie Museum of Natural History	Oct. 8, 2017	Pittsburgh, PA	In Person
12112017	Director of Museum	Carnegie Museum of Natural History	Nov. 2, 2017	Pittsburgh, PA	In Person
110112017	Director of Science	Carnegie Museum of Natural History	Nov. 10, 2017	Pittsburgh, PA	In Person
13122017	Curator	Carnegie Museum of Natural History	Dec. 3, 2017	Pittsburgh, PA	In Person
1292018	Program Assistant	Miami Office of Resilience	Sept. 2, 2018	Miami, FL	In Person
1492018	Program Assistant	305Miami	Sept. 4, 2018	Miami, FL	In Person
1592018	Geologist	University of Miami	Sept. 5, 2018	Miami, FL	In Person
11892018	Program Assistant	Miami Office of Resilience	Sept. 18, 2018	Miami, FL	In Person
12092018	Environmental Scientist	Florida International University	Sept. 20, 2018	Miami, FL	In Person
22092018	Environmental Scientist	Florida International University	Sept. 20, 2018	Miami, FL	In Person
12392018	CEO; Former Committee Member	Miami Sea Level Rise Committee	Sept. 23, 2018	Miami, FL	In Person
12892018	Program Manager	Catalyst Miami	Sept. 28, 2018	Miami, FL	In Person
13092018	Marine Biologist; Committee Member	Miami Sea Level Rise Committee	Sept. 30, 2018	Miami, FL	In Person

12102018	Ecologist	Florida International University	Oct. 2, 2018	Miami, FL	In Person
14102018	Program Manager	CLEO Institute	Oct. 4, 2018	Miami, FL	In Person
16102018	Assistant Director	CLEO Institute	Oct. 6, 2018	Miami, FL	In Person
18202018	Architect; Committee Member	Miami Sea Level Rise Committee	Oct. 8, 2018	Miami, FL	In Person
19102018	Artist	Miami Office of Resilience	Oct. 9, 2018	Miami, FL	In Person
111102018	Program Assistant	Catalyst Miami	Oct. 11, 2018	Miami, FL	In Person
113102018	Land Developer; Committee Member	Miami Sea Level Rise Committee	Oct. 13, 2018	Miami, FL	In Person
115102018	Hydraulic Engineer	Private Firm	Oct. 15, 2018	Miami, FL	In Person
215102018	Assistant Director; Committee Member	Miami Office of Public Works; Miami Sea Level Rise Committee	Oct. 15, 2018	Miami, FL	In Person
121102018	Artist	Independent	Oct. 21, 2018	Miami, FL	In Person
122102018	Real Estate Developer	Private Firm	Oct. 22, 2018	Miami, FL	Phone
129102018	Real Estate Developer	Private Firm	Oct. 29, 2018	Miami, FL	Phone
11112018	Land Use Attorney; Committee Member	Miami Sea Level Rise Committee	Nov. 1, 2018	Miami, FL	In Person
14112018	Co-Manager	Miami Office of Resilience	Nov. 4, 2018	Miami, FL	In Person
15112018	Neurobiologist; Committee Member	Miami Sea Level Rise Committee	Nov. 5, 2018	Miami, FL	In Person
111112018	Insurance Broker	Private Firm	Nov. 11, 2018	Miami, FL	Phone
119112018	Journalist	Independent	Nov. 19, 2018	Miami, FL	In Person

120112018	Engineer	Southwest Florida Water Management Authority	Nov. 20, 2018	Miami, FL	Phone
125112018	Civil Engineer	Private Firm	Nov. 25, 2018	Miami, FL	Phone
127112018	Hydraulic Engineer	Private Firm	Nov. 27, 2018	Miami, FL	In Person
130112018	Urban Planner	Private Firm	Nov. 30, 2018	Miami, FL	In Person
11122018	Policy Advisor; Committee Member	Miami Sea Level Rise Committee	Dec. 1, 2018	Miami, FL	In Person
21122018	Journalist	Independent	Dec. 1, 2018	Miami, FL	In Person
12122018	Co-Manager; Former Committee Member	Miami Office of Resilience; Miami Sea Level Rise Committee	Dec. 2, 2018	Miami, FL	In Person
13122018	Advisor	Southwest Florida Water Management Authority	Dec. 3, 2018	Miami, FL	Phone
12812019	Director	Rotterdam Office of Resilience	Jan. 28, 2019	Rotterdam, NL	Phone
12022019	Program Assistant	Rotterdam Office of Resilience	Feb. 20, 2019	Rotterdam, NL	In Person
12222019	Program Assistant	Rotterdam Office of Resilience	Feb. 22, 2019	Rotterdam, NL	In Person
11832019	Program Manager	Rotterdam Office of Water Management	March 18, 2019	Rotterdam, NL	In Person
1482019	Oceanographer	Technical University Delft	Aug. 4, 2019	Delft, NL	In Person
11882019	Climate Scientist	Erasmus University Rotterdam	Aug. 18, 2019	Rotterdam, NL	In Person
1292019	Environmental Engineer	Technical University Delft	Sept. 2, 2019	Delft, NL	In Person
11992019	Program Manager	Private Housing Corporation	Sept. 19, 2019	Rotterdam, NL	In Person
19102019	Hydraulic Engineer	Private Firm	Oct. 9, 2019	Rotterdam, NL	In Person

112102019	Program Assistant	Private Housing Corporation	Oct. 12, 2019	Rotterdam, NL	In Person
114102019	Hydraulic Engineer	Private Firm	Oct. 14, 2019	Rotterdam, NL	In Person
214102019	Civil Engineer	Private Firm	Oct. 14, 2019	Rotterdam, NL	In Person
118102019	Program Manager	Delfland Water Board	Oct. 18, 2019	Delft, NL	In Person
120102019	Program Assistant	Delfland Water Board	Oct. 20, 2019	Delft, NL	In Person
12112019	Elected Official	Delfland Water Board	Nov. 2, 2019	Delft, NL	In Person
15112019	Civil Engineer	Private Firm	Nov. 5, 2019	Rotterdam, NL	In Person
110112019	Policy Advisor	Netherlands National Delta Programme	Nov. 10, 2019	Delft, NL	In Person
113112019	Hydraulic Engineer	Delfland Water Board	Nov. 13, 2019	Delft, NL	In Person
114122019	Director	Private Housing Corporation	Dec. 14, 2019	Rotterdam, NL	In Person
1812020	Environmental Activist	Extinction Rebellion	Jan. 8, 2020	Rotterdam, NL	In Person
13012020	Hydraulic Engineer	Delfland Water Board	Jan. 30, 2020	Delft, NL	In Person
1232020	Hydraulic Engineer	Rijkwaterstaat	March 2, 2020	Rotterdam, NL	In Person
11842020	Civil Engineer	Rijkwaterstaat	April 18, 2020	Rotterdam, NL	In Person
11942020	Civil Engineer	Rijkwaterstaat	April 19, 2020	Rotterdam, NL	In Person

Table 2. Documentary Sources Referenced In-Text

Source Name	Source Type	Accessed Via	Years Collected
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City of Miami Sea Level Rise Committee Resolution	Local Government Resolutions	City of Miami Archives	2015-2018
City of Miami Sea Level Rise Committee Minutes	Local Government Minutes	City of Miami Archives	2015-2018
City of Miami Sea Level Rise Committee Workshop	Local Government Workshop Notes	City of Miami Archives	2015-2018
The Invading Sea	Journalism (print and audio)	Theinvadingsea.com	2018

Contact the author for more information about interview transcripts or documentary sources.

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