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By

Erin Condit-Bergren

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requirements for the degree of

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of the

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Committee in charge:

Professor Kate O'Neill, Chair
Professor Louise Fortmann
Professor Christopher Ansell

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Abstract

Discourse, Disaster, and the Urban Hazardscape: The political ecology of climate and disasters after Hurricane Sandy

by

Erin Amelia Condit-Bergren

Doctor of Philosophy in Environmental Science, Policy, and Management

University of California, Berkeley

Professor Kate O'Neill, Chair

This dissertation examines how the phenomenon of climate change is changing the public conception of natural disasters, and vice versa. Using the aftermath of Hurricane Sandy in New York City as a case study, this project draws on a year of in-depth fieldwork triangulated with media coverage, public reports, and city-level quantitative data to illustrate how popular misconceptions about how disasters happen were at work in the public response to the catastrophe. In particular, my research develops a conceptual framework using discourse analysis, to identify two false doctrines or tropes which underlie many of these misconceptions. The first, the doctrine of natural disaster, asserts that environmental disasters are fundamentally physiological rather than social in origin. The second, the doctrine of disaster exceptionalism, asserts that so-called natural disasters are rare and unpredictable events. The results of this project indicate that while climate change has the potential to disrupt these two false doctrines, this is not yet occurring in the public response to disaster. This dissertation also extends earlier work on the intersection of climate policy and environmental justice, known as the "climate gap", and extends it to adaptation, proposing an "adaptation gap" is also at work. Finally, this dissertation proposes a new test for delineating different types of climate change adaptation, further developing work on what constitutes transformational adaptation.

This dissertation is dedicated to my father, always my most ardent supporter, who died before seeing the final draft. I wanted so badly to finish before he passed away but couldn't make it happen. Yet anyone who knew my dad will also realize that there is no more fitting way to honor his memory than to blow a writing deadline.

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1 The Political Ecology of Disasters and Climate Change

1.1 The Storm

On Monday, October 29, 2012, the air crackled with unspent energy. The storm was still far off the coast but every media outlet buzzed and pinged and beeped with warnings. Not that anyone in the city needed the alerts any longer; the local authorities had preemptively shut down transit systems. People were taken aback by the loss of the subway - the pulsing veins of the city carried almost five and a half million people every weekday - and reminded them of the year before, when the city had shut down for Hurricane Irene and nothing much had happened. People took an overly warm snow day and, unless their bosses were clamoring them to get into work whether or not they had transportation, many people stocked up on food, water, and beer, and began calling friends to come over and ride out the storm.

From California, I was texting my friends and family back in New York, trying not to sound overly anxious. Disasters were old news, we thought, having experienced not only citywide blackouts but September 11th, the closest thing to the end of the world we thought we would ever see. "Going upstairs to play board games by candlelight! Woo party!" my friend texted back. I sat at my desk, my stomach in knots as I watched CNN's storm coverage, thinking that the computer images of Hurricane Sandy looked like a special effect from a disaster movie, except it was real and headed straight for New York, my favorite city in all the world. My special place was in trouble, and I wasn't there.

Six months later, I had moved back, with my research hat on and an abnormal enthusiasm for attending city council meetings. Everyone wanted to talk to me about those days in October, starting with my own new roommates. In the upper Manhattan building I now called home, things became alarming when the century-old apartment complex, a squat and solid six stories of brick and steel and prewar marble inlay grown dingy and chipped under the decades of foot traffic, began to sway in the wind. The subway was seven stories directly below us but we had never felt it; as far as any of us knew the place was directly connected to the bedrock. But on October 29, the windowpanes wailed and squeaked as they were alternately sucked outward and pushed inward by the storm. My housemate Shauna, whose bedroom overlooked Broadway and the trees in the park-like median strip, put a hand to the wall. It was moving with the windows. It turns out even brick facades can sway.

There had been another storm, a big one, one year earlier. What the city hadn't realized was that Hurricane Irene in 2011 was a test run, a shot across the bow. The floods were fourteen feet now, instead of twelve, and where there had once been seawater lapping at the edges of the subway entrance it now poured in like a Central Park water feature. The tunnels, tracks, platforms, the escalator bases and bundles of copper carrying the internet, all began to drown. Manhole covers popped outwards as the water pushed up from below to meet the tide as the East River claimed Alphabet City, and then the 14th street substation exploded and lower

Manhattan was plunged into darkness. In the towers of New York City, power also means water - above the sixth or seventh floor, depending on how the building is designed, water pressure has to be augmented by electric pumps. For the residents of luxury skyscrapers and public housing alike, those on upper floors who chose to ride out the weather now had no power, no water, no elevator, and only the wind for company.

In the outer boroughs, near the open water, things were much, much worse. In parts of Queens, Brooklyn, and Staten Island, the onrushing tide lifted boats and boardwalks, houses and cars, and acres and acres of sand. Residents of Rockaway Beach went to bed on October 29th not realizing that it would be February before the power was fully restored to their community, and May before the subway came back. This was not the storm from the year before. This storm was the real deal.

Hurricane Sandy is in many ways a paradox: a disaster notable by how many people did not die; an event which is inextricably tied to climate change and yet cannot be scientifically proven to be a product of it; both a catalyst for changing public debate and a retrenchment of old, habitual patterns of thought; a hurricane which was not a hurricane; a tragedy and an opportunity. The chapters that follow are the product of over a decade researching the social impacts of climate change, a deep love of New York City, and nearly a year of field research. I argue that Sandy is a turning point for the mainstream debate over climate change adaptation, especially in the New York City region, and it is also a powerful lesson about how adaptation can go wrong.

It shows how abstract discourses from academic literature such as the nature/culture divide are made real through public policy, and the distance between public policy and the reality of post-disaster survival in affected communities. The intersection of the event and the public consciousness, the narratives that people used to contest the meaning of the event, and the operations of power within these discursive constructions, contain significant lessons for scholars and policy-makers dealing with climate change adaptation and disasters.

In this chapter, I begin with the discourse[1] of disaster. I introduce two hegemonic narratives of disaster, the doctrine of natural disaster and the doctrine of disaster exceptionalism, which clearly operated in the aftermath of Hurricane Sandy. To understand these discourses and how they have come to be so powerful, I explain how commonly-held conceptualizations of nature intersect with, and maintain, relations of power in society. Within the context of nature and power, I also give a brief history of disaster scholarship that explains how these two doctrines persist despite decades of scholarship working to refute them. I will also begin exploring the relationship between the two doctrines, resilience, climate change adaptation, and social power, establishing the fundamental arguments and concepts which carry through the rest of the dissertation. The end of the chapter will give an overview of the whole dissertation, including an overview of each of the subsequent chapters.

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1. Discourse, for the purposes of this work, is an assemblage of collective speech, norms, and other patterns of social behavior that assign shared meanings to the phenomena around us.

1.2 Discourse and Disaster

The effects of disasters, whether human or nonhuman forces cause them, are socially mediated and in many ways socially determined. Disastrous events are the product of hazards, the potential risks that surround us every day. Despite this social origin, public understanding of disasters in the United States is governed by two shared notions of how disasters work, which I refer to as *the doctrine of natural disaster* and *the doctrine of disaster exceptionalism*. These shared notions (I will refer to them as the "Two Doctrines" as an abbreviation) are false, and they are the underlying cause of many dysfunctional approaches to disaster planning and recovery. Both of these Two Doctrines are manifested in public discussion of Hurricane Sandy's aftermath. However, climate change is changing the shared ideas of how hazards and disasters occur. The destabilizing effect of climate change and the way it forces society to re-conceptualize our relationship to the environment could, over time, bring about the collapse of the Two Doctrines and the social re-construction of disaster. In this section, I describe the major characteristics and consequences of these doctrines and the implications they have for disaster policy.

Discourse analysis is a tool used by interpretive social scientists, concerned with how society creates and assigns meaning to phenomena. The use of discourse analysis indicates a constructionist approach to knowledge-making (in which truth is subjectively interpreted through human experience) rather than a positivist approach (which is primarily concerned with the discovery of epistemic truth independent of social context). Maarten Hajer, drawing on Michel Foucault and other critical theorists, defines discourse as "a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities" (1995, p. 44). Thus discourse, for the purposes of this work, is an assemblage of collective speech, norms, and other patterns of social behavior that *assign* shared meanings to the phenomena around us.

This shared social attribution of meaning – discourse - shapes politics, and vice versa. This is not to argue that material reality does not exist, or to engage in an abstruse philosophical argument about matter and form. A physical object such as a shirt exists regardless of the people around it. However, physical objects and resources are also freighted with social meaning. In the case of our shirt, what were the conditions of production that made the shirt? How many laborers helped pick the cotton, spin the yarn, or cut the pieces and what were they paid? What kind of material is the shirt made of and why did the manufacturer choose that material? How much was the consumer willing to pay for the shirt and why? Does the person wearing the shirt intend to communicate something about their social status, their gender, their attitudes, or their cultural identity through the shirt? These questions – and whether or not an average person asks these questions at all – are a way to explore the social discourses around the production, consumption, and display of a material object.

The significance of a physical object is governed by a range of social relationships and choices. Understanding why, how, and for what purpose those relationships and choices are made is a question of discourse. The shared values, norms, cultural implications, and social identifications that constitute the underpinnings of meaning form the conditions in which people live. Dominant discourses, the meanings supported by those who have the most power in society,

must content with non-dominant discourses and narratives, new or different ways of telling stories about the world. These contests of meaning are *discursive contestation* or what Hajer refers to as *argumentation*.

Hajer establishes the concept of "story-lines" and "discourse coalitions" as analytical tools to identify how actors are contesting for discursive hegemony (1995). Story-lines are positional narratives which assign relationships between actors in a contested discursive space - assigning blame, credit, political urgency, and so on. Discourse coalitions are political coalitions that come together around a given set of story-lines (as differentiated from advocacy coalitions, which cohere around a set of norms). As Hajer explains, the argumentative approach sees politics as a struggle for discursive hegemony, or cultural dominance. By (a) recognizing discourse as a political tool and (b) adopting the Foucaultian approach of studying power through its manifestations, Hajer's argumentative approach is a lens through which to interrogate and challenge the exercise of political power.

When individuals or the media are telling stories about disasters, particularly weather-related disasters, these stories are conditioned by a shared set of ideas about how disasters take place, what they mean, who or what is responsible, and what should happen next. This set of shared concepts and norms is the dominant discourse of disaster, and within this discourse there are two major assumptions - which I refer to as "doctrines" to distinguish them from the larger assemblage of the discourse.

In the first doctrine, the *doctrine of natural disaster*, the assumption is that there are two different forms of disaster. One form is social or political, encompassing war, cyber-attack, disease epidemic, or the release of a pollutant associated with technology such as nuclear fallout or dioxins. There is a clear link between human agency and the disastrous consequence, and it is assumed that human failures have caused this disaster. The other type of disaster has a nonhuman agent - this is referred to as "natural" disaster. Partly as a consequence of the historical dichotomy between nature and society (which I will discuss in more detail later), and partly because it is a convenient fiction, these types of disasters are relegated to a conceptual realm outside of human control. This includes disasters where the immediate causative agent is obviously nonhuman - such as earthquakes, lightning-caused fires, or landslides. It also includes weather-related disasters, where due to anthropogenic climate change the immediate causative agent is a mix of both human and nonhuman influences.

However, why do disasters play out the way they do? Take the example of an earthquake. It is rare for people to live in an earthquake-prone area with no awareness that an earthquake may occur, so there are a range of individual choices available to minimize earthquake risk, such as bolting large pieces of furniture to the wall and not mounting heavy paintings above the bed.

There are also a range of important social choices which are undertaken collectively, such as whether to build a major public facility on a significant fault line, seismic standards for home, school, and office construction, and the integration of earthquake caution into public systems (for example, earthquake drills in schools or automatically stopping rail transit after an earthquake to check for damage). The location of risky structures and businesses - such as the

siting of chemical factories - is also a social choice. The accumulated result of these social choices generates differential patterns of harm. The poor are more likely to suffer in a disaster not because they are poor, but because they are more likely to live in housing that is not up to code.

The problem with mentally relegating "natural" disasters to the realm of non-human agency is that doing so ignores the way social choices govern disaster outcomes. Eric Klinenberg, writing about the deadly Chicago heat wave of 1996, found that people living alone in very dangerous neighborhoods were much more likely to die than other populations, because they lacked a social network to help them in times of distress, and because they were more worried about the risks of going outside into a neighborhood they perceived as violent than they were about the risks of staying inside in the extremely dangerous heat. These conditions were the result of "social and spatial division that governs the metropolis", rather than the product of the heat alone (Klinenberg 1999).

The same patterns were seen in New Orleans after Hurricane Katrina. What appalled observers was not the ferocity of the storm itself, but the way the storm's outcomes displayed underlying patterns of social inequality and deprivation. The fact that the majority of death and destruction occurred in poor neighborhoods populated by people of color was not an outcome of wind or rain but the accumulation of generations of segregationist policy, racism, and toleration of extreme economic inequality (Picou & Marshall, 2007). The later militarization and bungling of the emergency response was overtly a function of endemic racism and administrative incapacity (Preston 2008; Solnit 2010).

Working in tandem is the second doctrine, the *doctrine of disaster exceptionalism*, wherein disasters are seen as aberrations and accidents, events that are outside the realm of everyday life. The goal of post-disaster recovery is to return as quickly as possible to the pre-disaster mode of existence. Over three decades ago, Kenneth Hewitt (1983) wrote about disasters as being confined to an "archipelago of exceptionalism", a sentiment echoed by Oliver-Smith (1999a), Quarantelli (2005a), Luft (2009) and others.

1.3   Consequences of the Two Doctrines

By relegating disasters to what is "natural" (and thus, non-social) and "exceptional" (and thus unpredictable), the two doctrines work together to obscure the fundamentally social character of disaster outcomes. They also make it harder to recognize that the solutions to the problems which disasters reveal are also, at their core, social. For example, Klinenberg contrasts the outcry over the city government's failure to immediately resolve the inconveniences of a blizzard with the, arguably, more significant consequences of so many deaths and illnesses during the heat wave.

> "How is it that a natural disaster that kills hundreds of residents is less politically damaging than a disaster whose most significant effect was to block roads, stall public transportation, close schools and businesses, and restrict movement in the city? The answer is, in part, that the blizzard was

much more damaging to Chicagoans with political clout than the heat wave, which, while killing hundreds, had almost no impact on elites and did relatively little harm to businesses" (1999).

Media attention - and thus public awareness - is modulated by the power of elites, but this is not the only way that politicians and elite decision-makers avoid responsibility for the choices they have made regarding disaster.

The doctrine of natural disaster helps the elite to avoid blame through two seemingly contradictory processes. First, by relegating the agency of the disaster to the category of "natural" rather than "social", decision-makers can claim they do not have predictive power nor control over these natural processes (Brown 2011; Castree 2015; Collins 2008; Comfort 2005; Corfee-Morlot, Cochran, Hallegatte, & Teasdale, 2011; Jasanoff 2003; Johnson & Priest, 2008; Ntelekos, Oppenheimer, Smith, & Miller, 2010; Pelling & Dill, 2010; Simon 2014a; Wagner, Chhetri, & Sturm, 2014). Second, at the same time the predominant approach to disaster planning and management is to control hazards by knowing them fully, making them predictable. This rests on the assumption that poor disaster planning and recovery is driven by a lack of information, and that increased information will lead to increased ability to manage hazard.

Second, awareness of disasters and hazards is not integrated into daily existence, because they are exceptional events. The goal of disaster planning is to eliminate the hazards that cause disasters, rather than to incorporate an awareness of these hazards into future planning. Third, the social aspect of disasters and hazards is under-recognized, and thus the physical and engineering approaches to disasters are over-emphasized. Finally, these two doctrines work together to obscure the relationships between power, culture, and social structure that underpin the unequal distribution of risk and recovery.

Scholars have argued for many years that disaster are characterized by social choices, not natural forces, and they have also argued that disasters need to be seen as non-exceptional, recurrent events which can be anticipated but not fully controlled. Therefore, why are these two doctrines so persistent?

Disaster practitioners and scholars have historically classified disasters by their origin, which is to say by the type of hazard that causes the disaster. While some hazards are purely social in origin, such as the risk of violence from another human being, or the risk of being hurt in a car accident, other hazards have a nonhuman origin such as tsunamis and avalanches. The predominant notion has been that non-human hazards and human hazards need to be approached differently, with different mechanisms of control. These two types of hazard have carried through to the social understanding of the aftermath of hazard, whereby the outcomes of "social" disasters such as terrorism are seen as social disasters and the outcomes of "natural" disasters such as floods are seen as natural, and thereby naturalized.

To put this in less abstract terms, consider Hurricane Katrina. The storm's physical reality is not contested; it was an extremely powerful hurricane. However, the magnitude of the storm was not unprecedented and a storm of this type was a known risk in the area. The notable physical effects

of the storm - the flooding of the ninth ward, the Gulf Coast of Mississippi and other areas, the wind damage causing widespread power loss - were as much the consequence of the storm's severity as of the many historical choices made by the Army Corps of Engineers, the Bureau of Reclamation, the city government of New Orleans, and other political agents who sought to control the flow of the Mississippi River (Barry 1998). The levee failures, which caused a cascade of flooding, had been predicted many years earlier and the choice had been made not to reinforce and retrofit them. Patterns of settlement and land reclamation had reduced the amount of land that could absorb storm surge and rainfall without loss of life to human inhabitants.

Additionally, the historical legacy of slavery, racism, and segregation left black and poor residents to live in the most highly vulnerable parts of the city. Nor was the physical character of the storm responsible for the reprehensibly poor quality of the post-disaster relief effort, the lack of effective rebuilding, and the permanent or semi-permanent displacement of many of the city's residents. Yet even after Hurricane Katrina publicly displayed the social inequalities governing the aftermath of the disaster, hurricanes and other weather related disasters continued to be labeled "natural" disasters.

 Within this new political context, Hurricane Sandy is a valuable lens through which to view changing public understandings of climate change and disasters. The aftermath of Sandy illustrates the ways in which the doctrine of disaster exceptionalism conceals and reinforces hierarchies of power within society. It also shows how climate change is changing the Two Doctrines, and how popular resistance and public engagement are creating new opportunities to challenge those hierarchies of power. While both disasters and climate change are phenomena with many negative social consequences, they have also opened up new possibilities for social change. To illustrate these points, I examine a range of qualitative data sources including interviews, public documents, and media coverage using the discourse analysis method. The results of my discourse analysis are contextualized, enhanced, and made applicable within the larger analytical frameworks of political ecology and hazardscape (see Chapter 2).

1.4   Hybrid disasters, nature, and power

As mentioned above, scholars have historically categorized disasters by whether their origin is human or non-human. Climate change has disrupted this traditional classification system for disaster origins, into (a) hazards that are purely human in origin, (b) hazards which are purely nonhuman in origin, and (c) hazards which are a *hybrid* of human and nonhuman influences. I argue that scholars and practitioners need to move to a shared understanding of disaster as a socially-mediated event, predicated by hazards which may not be fully knowable but can be anticipated.

To effectively respond to hazards, societies must accept that disasters are inevitable and, in many ways, unpredictable because of their complexity, and one of the major ways to hedge against the risk of disaster is to build social adaptive capacity. This shared understanding is a break from both the doctrine of disaster exceptionalism and the doctrine of natural disaster. Work after Hurricane Sandy shows a growing public understanding of the hybrid origin of weather-related

disaster. This is particularly true in the community of decision-makers. This notion of hybrid disaster is a refutation of the natural/social categorization of disaster origins. I argue that because this categorization is being disrupted, and because it is foundational to the Two Doctrines, the Two Doctrines are now being disrupted by climate change. This disruption may be an opportunity to push the social understanding of disaster toward a notion that recognizes disasters are socially mediated hybrids of risk and collective choices. This new understanding can help people make better choices about how to approach, deal with, and prepare for disasters. It also challenges a persistent myth – that the natural world and human civilization exist as separate entities.

Many scholars have written about the false dichotomy between nature and society, which remains powerful despite the way that human society and the non-human environment do not just coexist but in fact co-construct one another. One manifestation of this false dichotomy is the discourse of techno-optimism, whereby environmental problems are seen as having solutions which are purely technical, physical, and increasingly complex. This discourse of techno-optimism, in turn, is rooted in historical notions of human dominion over the natural world, as well as the epistemic hierarchy within the academy and policy-making which privileges the quantitative and physical over the qualitative and social (Braun & Wainwright, 2001; Callon 1986; Cronon 1996; Demeritt 2001; Forsyth 2004; Haraway 1989; Hulme 2009; Latour & Woolgar, 1979/1986; Mahony & Hulme, 2016; Merchant 2003). One major critique of techno-optimism is that it sidesteps the relationship in society between technology, privilege, and power, and ignores the many ways in which technology has been used by the powerful to further their own interests at the expense of the less powerful (Castree 2015; Hewitt 1983; White, Kates, & Burton, 2001; Wynne 1996, 2010).

Likewise, classifying disaster as a purely geophysical event is a way to obscure how power mediates which disasters are given social importance, who is privileged in the anticipation of and response to disasters, and the ways in which our shared understandings of disasters and hazards are structured by hierarchies of power (Collins 2008; Hewitt 1983; Simon 2014a; Wisner, Blaikie, Cannon, & Davis, 2004). The fact that disasters are seen as physical, rather than social, phenomena is what enables elite members of society to co-opt not only the disaster recovery process but the shared meaning of disaster itself to maintain their own status within the hierarchy of power. Exposing these relations of power is a way to make that process of co-optation more difficult, and a way for those who are less powerful to apply leverage and make the disaster planning and recovery processes more equitable.

The popular idea of "nature" is regarded as that which is outside human civilization, or the built environment. Yet our understanding of nature is fundamentally a reflection of our own social history. As Raymond Williams wrote, "any full history of the uses of **nature** would be a history of a large part of human thought" (Williams 1985, p. 221). Just as the biblical God is both the vengeful deity of the New Testament and the loving father of the Old Testament, Williams highlights the dualistic tension between the two major personifications of nature in Euro-American thought: Nature the benevolent goddess and Nature the merciless.

The former figuration of nature, during the Enlightenment and the Romantic period, "was contrasted with what had been made of man or what man has made of himself...first, an obsolete or corrupt society, needing redemption and renewal, and, second, an 'artificial' or 'mechanical' society, which learning from **Nature** must cure" (1985, p. 223). This Enlightened Nature was that of Rousseau's *Emile*, wherein only wild, uncivilized nature could be the true teacher, the vehicle wherein the citizen might discover his own authentic self. (It is worth noting, also, that *Emile*'s nature includes a 'natural' role for women as subservient helpmeet to the enlightened male: in keeping with the less rational, more vulnerable 'nature' of woman they could be trusted to bear and raise children, but not make fully independent decisions.) In this, of course, we see both the identification of 'Nature' as the incontrovertible source of true reason and the presentation of historical chauvinism as a product of the same immutable natural laws. This is just one of the many examples in which the shroud of an essentialized Natural Law is thrown over beliefs, prejudices, and practices which are in reality socially constructed, a tendency which can often be identified in contemporary popular discussions of environmental and social ethics.

As William Cronon notes, the idea of nature is inherently tied to the concept of "wilderness", the sense of being "in the presence of something irreducibly nonhuman, something profoundly Other" (*Uncommon Ground: Toward Reinventing Nature* 1995, p. 70). In the American imagination wilderness, like the land itself, has transitioned from a darkened, fearful nonhuman space to become the subject of colonization and dominion. In contrast to the Romantic notion of the sublime landscape, the experience of which was characterized by a sort of supernatural terror, American writers described a "domesticated sublime" wherein bourgeois ideals of rugged individualism could be played out on in a majestic scale (Braun & Wainwright, 2001; *Uncommon Ground: Toward Reinventing Nature* 1995). In wilderness, Cronon finds a major linchpin of the discursive separation between humans and nature, "the trouble with wilderness is that it quietly expresses and reproduces the very values its devotees seek to reject...if we allow ourselves to believe that nature, to be true, must also be wild, then our very presence in nature represents its fall. The place where we are is the place where nature is not" (*Uncommon Ground: Toward Reinventing Nature* 1995, p. 80).

As many scholars and writers have described, the popular construction of wilderness is also profoundly exclusionary, in keeping with the United States' fraught gender and racial hierarchies (Braun & Wainwright, 2001; DiChiro 2003; Finney 2014; Guha 1997; Hajer & Versteeg, 2005; Haraway 1989; Romm 2001). The discursive construction of nature and expeditions therein were intimately tied to the predominant notion of American whiteness (and maleness) whereby the enlightened individual might supersede the (literal and metaphorical) filth and noise of city life through communion with "pristine" nature (Braun & Wainwright, 2001). Yet in order to achieve this transcendent state one must first not only be a member of "civilization" but to participate in a discursive construction of everyday life that excludes both nature and the supposed risks entailed by it. Thus we find that within the representational politics of the natural space there is no room for the non-White, for the American Indian or First Nations member (Krech 1999), for the African-American (Finney 2014), for those outside the realm of whiteness are those who have also failed to become fully civilized.

"The search for nature (as a return to original) was something that only Europeans needed to participate in because it was only they whose advanced development had opened an almost unbridgeable gulf between a cultural present and a natural or biological past" {Braun 2001@196).

Thus one can see that beyond the representational criteria of who should or should not be included in the "natural" landscape, the dominant view of the natural world is one in which society has imprinted its own rules of hierarchy - and in turn, society uses the discursive construction of "nature" to in turn justify those rules.

1.5 Defining Disaster

Empirical and historical analyses show that disasters of both anthropogenic and non-anthropogenic varieties are recurrent in human society, and indeed adaptation to hazards and disasters is a major part of human culture. Additionally, as scientific understanding of the geophysical drivers of hazard advances, disastrous events are better understood and more easily predicted than ever before. Anthropogenic climate change has permanently altered the hydrological cycle, which is the origin of most disasters termed "natural."

Therefore, climate-related disasters are no longer the result of nonhuman processes but are the hybrid product of human and nonhuman influences. The changing scientific understanding of these phenomena is driving changes in the public understanding of, and response to, these phenomena. Climate change is also changing the way that people understand weather-related disasters, causing them to contextualize the hazards differently. Scholars have been working since the 1980s to expose the connection between social structures, power, marginalization, and the differential impacts of hazards and disasters. Nonetheless these impacts are routinely portrayed as being an inevitable product of the disaster itself rather than the consequence of social choices.

The argument put forth in this dissertation is that there is a third major category of disaster, the hybrid disaster, where the hazard itself is the product of both human and nonhuman influences working in tandem. An event caused by a hazard and resulting in major negative effects for human society is a disaster. The impact that a given disaster has on human society is not a product of the type of hazard (human, nonhuman, or hybrid), but the product of the choices which human society has made in the context of potential risk. In particular, the distribution of harm from a disaster is socially controlled; whether or not the disaster is caused by a geophysical risk does not control the distribution of harm.

1.5.1 Boundary-making in disaster politics

To study a phenomenon, scholars need to make a distinction between what does and does not fit into their framework of analysis. What constitutes a disaster is far from straightforward, particularly when approaching disaster studies from an interdisciplinary perspective. Ronald Perry goes on to point out that "definitions can be seen as a form of reconstructed logic, and by identifying themes one is at least attempting to capture the logic in use" (2007, p. 12). If this

chapter were aiming for a larger literature review on disasters, the definitions themselves would be a useful categorizing tool - scholars may be writing in different fields, but share overlapping conceptualizations of disaster even while scholars in the same field employ starkly different definitions.[2]

Conventional wisdom is that sociologists focus on the social process which occur in the aftermath of disaster, whereas the geographers (including the human ecology school) look at the hazard itself (Mustafa 2005; Perry 2007; Tierney 2007). This distinction has two major flaws. First, the separation between human society and external hazard is an artificially created one that fails to recognize the historical context in which human societies develop - there is a place-based intersectionality between human culture and perception of hazards. Second, it is difficult if not impossible to study the social epiphenomena of disaster without studying the hazardous conditions that gave rise to the disaster, and vice versa.

Other significant questions include: Is disaster an event or a process? Who or what has agency in a disaster, humans or nonhuman systems? When does a disaster begin and end? Let's take a hurricane, for example. When does it begin? Is it when the hurricane begins to form over the ocean? Is it when the warning is given to potentially affected areas? Is it when the hurricane makes landfall, or before? What about the end of the event? Is it when the flood waters recede or dry up? Is it when the last house is condemned or boarded up? Or is it when the last child returns to school? Is it when the last free meal is handed out by the Red Cross? The experience of any given disastrous event is multifarious, with the actual effects of a given event determined by deeply intertwined human and nonhuman agencies.

The human choices as to whether to put generators in basements or attics, whether to evacuate, whether to mandate stricter building codes for homes and schools, and how to prepare for a potential hazard - these determine whether or not a hurricane is a catastrophe as much as the wind speed and the temperature of the offshore water. As scholars point out, people often conceptualize of hazardous events as unexpected "accidents" - just as unpredictable as a car crash or a fallen piece of decorative masonry (Erikson 1995; Hewitt 1983; Quarantelli 2005b). Yet hazards are independent of human habitation - undersea earthquakes or Antarctic glacial calving only become disasters if they affect people. And the extent to which they affect people, when, where, and for how long - these aspects are consequences of human actions and agencies.

Like the definition of disaster, the authoritative conceptualizations of timescale, agency, and vulnerability have definite material consequences. When a disaster "ends" forms the barrier for who is or is not eligible for relief or other forms of assistance. Who - or what - is to blame for a disastrous situation mediates how society makes choices in anticipation of potential disasters. Whether a disaster is described and understood by authority figures as an isolated event with a beginning and an end or a process - for example, a permutation in a cycle of hazard, or a punctuation mark in a political struggle - directly affects how communities perceive disastrous events, how affected residents receive aid, and how lessons are learned in anticipation of future

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[2] For an older, but thorough, discussion of this point, see Oliver-Smith 1999.

disasters (Bergren et al., 2013; Erikson 1995; Gould, Garcia, & Remes, 2016; Guggenheim 2014; Pelling & Dill, 2010; Perry 2007; Steinberg 2006).

1.5.2 Agency in disasters

Similarly, every definition of disaster contains within it implicit notions of where agency lies - with the geophysical phenomenon or with the people experiencing it. A major issue for those scholars concerned with climate change and disaster is the discursive separation of agency between the hazard (typically speaking, a non-human catalyst of disaster) and the human "response" to hazard. In other words, many disaster scholars implicitly or explicitly construe the disaster is a discrete physical event related to a latent hazard. The social effects of the disaster, the human interpretations of it, the response to it, in short all of these social processes that are affected by disaster, operate in a separate system from the physical hazard, like overlapping layers in a GIS model.

Climate change complicates the question of agency. Disasters which arise from the hydrological system are now tied to a phenomenon which is driven by human activity - therefore, these "natural" disasters cannot be considered as separate from human influence, but as a product of combined human and nonhuman agency. Therefore, human agency drives the disaster as well as driving the response. Note that the word "response" connotes acting after the fact and as a consequence of it, even though most disasters are also anticipated in advance - therefore there are elements of "response" both before and after a disaster.

A more thoughtful approach to mitigating disaster risk also assigns greater agency to society and community, taking agency away from the non-human actant. Yet is it any less a question of human agency if pre-emptive action is *not* taken when knowledge about a hazard is known? This then takes disaster into the realm of politics, responsibility, and blame (Boin, McConnell, & t'Hart, 2008a). Who bears responsibility in the absence of political will and popular misunderstanding of hazard? Are experts and decision-makers obligated to overcome a cognitive bias in which societies consistently prepare for the last crisis event, rather than the next one? Mark Pelling tries to sidestep the complicated question of human vs. nonhuman agency by arguing against the word "disaster" in and of itself, arguing that the question is actually one of "humanitarian crises with a natural trigger" - although this definition still reinforces the natural/social divide (Pelling 2001).

Some in the political science community argue in favor of studying "crisis" rather than disaster (Boin, McConnell, & t'Hart, 2008b), placing agency squarely in the human camp, but this likewise reinforces a division between natural and social and also marginalizes the influence of nonhuman agency. The challenge is to view disasters as hybrid processes, the product of both human and biophysical agency, mediated by human choices, rather than falling into a binary trap which inhibits a full understanding of how disasters and societies interact. To do so, I argue that disasters are a necessary and valuable lens through which to view social processes, *in addition to* being processes that can be studied in and of themselves.

Writing as a sociologist, Eric Klinenberg sees disaster not just as a social process in and of itself but as a social process which reveals "the entrenched logics of social and spatial separation which govern the city" (1999, p. 240). In this he is writing about the aftermath of disaster, not the disaster itself (although given that the heat wave which is the subject of Klinenberg's analysis lasted for nearly a week, the temporal scale adds additional complexity). As the section on discourse analysis below shows, it is not just the action that is taken after the disaster but the *interpretation* of disaster that reflects and re-creates these social logics. Klinenberg implies that the failure of a government to protect its people from environmental harm can be tied to Bordieu's notion of symbolic environmental violence (Klinenberg 2003, p. 244).

Carrying this idea further and combining it with the "logics of separation" while applying it to Hurricane Sandy raises the question of whether the city's abandonment of vulnerable communities after the storm could be examined as a form of state violence and control. These themes are strongly present within scholarship on Hurricane Katrina (Chamlee-Wright & Storr, 2009; Giroux 2006; Jonkman, Maaskant, Boyd, & Levitan, 2009; Tierney, Bevc, & Kuligowski, 2006; Yarnal 2007). Arguably, this state violence is enabled through the technocratic approach to disaster, discussed below, which deals with the biophysical but not social elements of a disaster situation. This will be discussed more extensively in Chapters 3 and 4.

Defining what is or is not a disaster contains a range of socially mediated choices that validate some narratives of disaster and not others. In fact, given the culturally contingent and politically freighted notion of disaster, it may not even be useful to settle upon a single, totalizing concept of what disaster is and isn't. Wisner et al (2004) characterize disaster as an essentially contested concepts, and Oliver-Smith asserts that instead of trying to achieve an absolute and universal definition, it is more useful to think of disaster as an assemblage of concepts, "a set of family resemblances among a wide array of physical and social events and processes" (Oliver-Smith 1999a, p. 12).

To place boundaries around an academic investigation, many eminent disaster scholars argue that the definition of disaster should be predicated on the end goal (socially or intellectually speaking) of studying the disaster or hazard in the first place. Enrico Quarantelli (2005b), Ronald Perry (2007), and Anthony Oliver-Smith (1999b) assert that social scientists need to define disasters for themselves, not in the absolute but in the context of the question at hand - because almost any process which produces a negative impact on a social group could be considered a disaster given a particular lens. For social scientists, defining disaster is to establish the bounds of one's investigation. One of the reasons for the effort to ring fence "natural" disasters in scholarship is that the non-human hazard provides one of the few clear lines with which to define disaster in an (purportedly) apolitical, "objective" context. Yet the distinction also carries major material consequences.

1.6 A Brief History of Disaster Studies (and its critics)

Hazards, disasters, and catastrophes are examined in a wide range of academic fields, most notably geography, public policy, public health, sociology, ecology, and political science. Many scholars trace the study of natural hazards back to Gilbert White and his 1945 paper *Human*

Adjustments to Floods. While White was the first to engage in an in-depth discussion of how local settlements interacted with flood hazards, scholars in the United States had been trying to make sense of natural hazards in a sociological context since the 1906 San Francisco earthquake (Solnit 2010). Although the governmental response to the earthquake reflected a fear of popular unrest, in retrospect it became clear that the most socially disruptive influence had been the US Army's battalions deployed from Fort Funston to "quell disorder" (2010).

This pattern is repeated over and over in disasters up to the present day, a phenomenon which Kathleen Tierney and her collaborators refer to as "elite panic" (Tierney 2006). Tierney's work is rooted in that of Charles Fritz and Enrico Quarantelli, who began publishing research on disasters in the 1950s and took pains to emphasize that the popular conception of disaster-induced panic was belied by empirical data (Fritz & Marks, 1954). Likewise, Prince's study (1920) of the catastrophic explosion in Halifax, Nova Scotia in 1918 emphasizes the way in which members of the public sacrificed themselves to save others in the immediate crisis, and how the longer-term aftermath was characterized by solidarity and mutual aid among members of the profoundly disrupted community.

In 1932, LJ Carr was the first to root the concept of "disaster" in a larger social context; by defining a disaster by its aftermath he pointed out that disasters with no human effects aren't really disasters at all. More importantly, he tried to identify a "sequence-pattern" of the changes that disasters prompt within society: "Social change in disaster is catastrophe, plus cultural collapse, plus peril and perhaps death, plus disorganization, plus reorganization - it is not one of these alone, but all of them together. In other words, it is not a single event or even a single kind of event*: it is a series of events linked with one another*" (Carr 1932, p. 215, emphasis in original). Carr was the first to begin thinking of disaster as process. Prince, Carr, and Fritz were the early progenitors of a scholarship which examined the socially embedded character of disasters, with an emphasis on process, society, and critical analysis of qualitative data.

The human ecology approach, which is most strongly associated with White, sees its origins in the 1920s as well, with Harlan Barrows' 1923 presentation of 'geography as human ecology' (Cutter, Mitchell, & Scott, 2000). White and his students at the University of Chicago took a pragmatic approach to hazards, seeking to understand spatial patterns of hazard vulnerability in order to improve public policy; the work of this group of scholars prompted significant changes in flood and emergency management both in the US and abroad. The human ecology school drew from a behavioral studies approach to examine why individuals made the choices they did within the range of possible responses to hazard (Cutter et al., 2000; Perry 2007; White 1945). Hazards were no longer isolated events, they had patterns, and these patterns influenced the development of human settlements. Yet humans could also consciously choose to anticipate hazard and thereby lessen the effects of disasters. The human ecology school continues to dominate the boundary between the academy and emergency response practitioners in the public sector.

This strand of human geography has in many ways adopted the terminology, epistemology, and preoccupations of governmental approaches to hazard: a continued emphasis on individual choice models, a desire to identify spatial patterns, and above all a preoccupation with *quantifying*

these varying degrees of vulnerability across spatial scales (Adger et al., 2009a; Cutter 1996; Cutter et al., 2000; Finch, Emrich, & Cutter, 2010; Mustafa 2005; Tate, Cutter, & Berry, 2010). Although this is an understandable response to the needs of policy and practitioners, and the human ecology approach continues to be fruitful in terms of policy-relevant scholarship, it neglects the larger social dynamics which produce and are produced by these unequally distributed hazards.

Models such as the Social Vulnerability Index (Cutter, Boruff, & Shirley, 2003) or the "multivariate factor analysis method of vulnerability" (Cox, Rosenzweig, Solecki, Goldberg, & Kinney, 2006) effectively communicate the *what* but not the *why,* because they can only include phenomena that can be quantified and cross-referenced. For example, they can effectively compare an assessment of derelict housing with poverty indicators and with earthquake subsidence risk, but this type of analysis cannot explain the linkages between the poverty and the derelict housing, or put forward an explanation of why the housing stock in the physically vulnerable area is subpar. To do so requires political and historical analysis rooted in social theory, and it requires the availability of non-quantitative data for ground-truthing.

A theoretical approach known as political ecology emerged among development, geography, and ecology scholars in the 1970s, founded on the approaches of political economy and cultural anthropology. Emphasizing interdisciplinary analysis, historical context, and inter-scalar linkages, this group of scholars became prominent critics of the human ecology approach to hazards. Kenneth Hewitt's introductory chapter to his 1983 edited volume, *Interpretations of Calamity*, argues that the dominant approach to disaster studies has "quarantined [natural disaster] in thought as well as practice" and confined environmental hazards to "an archipelago of isolated misfortunes" which fails to recognize that natural hazard is endemic to human society (Hewitt 1983, p. 12).

Hewitt's emphasis on social inequality appears Marxist in its orientation (Pelling 2001) but is much more strongly allied with the critical theory approaches of Foucault and his followers. Invoking Foucaultian notions of governmentality and territoriality - by which a state controls a populace through the administration of discourse and space - Hewitt writes that the quantitative, model-oriented approach to hazards and disasters scholarship produces "not 'models' of reality at all, but *managerial devices*" which "bear little or no relation to actual places or conditions, the material interactions or human experience involved" (Hewitt 1983, p. 13). In short, the wholly beneficial desire to produce policy-relevant scholarship has produced a field of scholar/managers who systematically ignore messy, qualitative reality in favor of clean, 'enclosed', environmentally deterministic modeling. Mainstream hazards research "does not reflect upon the extent to which the institutions it serves...could be part of the problem" (1983, p. 14)

Hewitt's critical approach was echoed in Blaikie, Cannon, Wisner, and Davis's *At Risk* (1994, and in the second edition, Wisner et al 2005). These authors made the unequal distribution of vulnerability their central concern, arguing again that disaster studies was biased so strongly towards a wealthy, colonial Western perspective that it obscured the dramatic differences between the realities of natural hazard in rich and poor nations. Like Hewitt, the work of Blaikie et al and subsequent scholarship in that vein (Collins 2008; Mustafa 2005; Pelling 2001;

Tompkins, Lemos, & Boyd, 2008) rejects the idea of disasters and hazards being exceptional circumstances, divorced from the larger spectrum of society-environment interactions. *At Risk* is particularly notable for its vulnerability approach, which moved the conceptual focus away from *physical* vulnerability and onto *social* vulnerability. The effects of a disaster weren't the deterministic product of geophysical risk, they were instead the product of how a given society had chosen to adapt to its physical circumstances.

In turn, the harmful products of a given environmental hazard such as earthquakes or floods were the measurement of how well the built environment was *adapted* to hazard - disasters were an indicator of inadequate adaptation. Within any given society, patterns of adaptation were governed by the same structural economic forces that shaped social inequalities, in particular socioeconomic marginalization, the active stratification of society. Marginalization produced inequalities within and between countries that were regulated by larger economic forces, and these inequalities in turn produced stratification of social vulnerability. The unequal distribution of social vulnerability, in turn, was the cause of unequal exposure to hazards.

However, as Anthony Oliver-Smith (1999a), Mark Pelling (2001) and Timothy Collins (2008) point out, the vulnerability approach of *At Risk* contained a number of major weaknesses. The authors appear to be preoccupied with political economic structures, particularly the inequalities between the nations of the global north and global south. While it is correct to note that the scale of a hazard or disaster is very different depending on a country's economic status, *At Risk* ignores the political economic marginalization that occurs *within* nations, and also excludes the capability approach of development studies which links the reduction of socioeconomic vulnerability with the expansion of political and social rights (Pelling 2001; Sen 2000).

In a similar vein, the heavy-handed political economic orientation of *At Risk* under-emphasizes the role of culture and norms. Political ecologists are often critiqued for being too deterministic or structuralist – a critique which is borne out in this particular work – but the problem is addressed in a range of other paper and chapters (Adger et al., 2011; Brown & Westaway, 2011a; Kaswan 2012; Manyena 2006; Oliver-Smith 1999a; Seneviratne et al., 2012; Wagner et al., 2014). It is notable, then, that no single-volume follow-up to *At Risk* has emerged to re-orient the field. Wisner, Blaikie, Cannon, and Davis were correct to highlight the way development aid and Western technocracy reinforce vulnerability to hazard in the developing world, but their analysis can also be interpreted as a reinforcement of the dichotomies they are seeking to challenge: between "wealthy" and "poor" nations, between "nature" and "culture", and between hazards research and the wider spectrum of environment and development studies.

A notable follow up from the political ecology community is Timothy Collins' work on the White Mountains in Arizona. As he illustrates, hazard and vulnerability are not only the products of marginalization, they are the product of its opposite social process: facilitation (Collins 2008). In the fire-prone, mountainous region of Arizona which is the subject of Collins' analysis, the creation of an "amenity economy" has encouraged a new demographic to settle in the area, white upper-class professionals who aim to situate themselves within an aesthetically beautiful context apart from urban life. This settlement pattern, and the "service underclass" which develops around it, is encouraged by local institutional structures.

As a result, two cultural landscapes emerge in the same space, an "amenity landscape" and a "livelihood landscape", with highly stratified forms of vulnerability. The same institutional structures, such as the ready availability of insurance and a sympathetic local government, which support the settlement of wealthy white professionals also help to insulate them from fire hazard whereas those with less institutional access occupy a very different level of vulnerability. For the locals whose livelihoods depend on the ecological integrity of the landscape, yet another level of vulnerability exists. Yet while institutions and political economy are the most obvious factors governing facilitation and marginalization, these patterns are also the product of local culture and traditions, changing social norms regarding environment and amenities, the separation of professions from livelihoods, and historical political conflicts.

Collins highlights two critical failings of Blaikie, Cannon, Davis, and Wisner. Too narrow a focus on marginalization and vulnerability fails to incorporate the ways in which local landscapes offer material, social, and psychological benefits. Additionally, patterns of vulnerability are the product of complex local relationships, which in Blaikie et al's analysis are hidden behind the colonial relationship of core and periphery. Residents of highly vulnerable landscapes, even when they have been marginalized, are still capable of choice and agency, and too exclusive a focus on political economy risks reinforcing the capitalist mythos of the rationally maximizing individual. Importantly, it also maintains a separation between human civilization and the biophysical landscape, when human choices both respond to and change the attributes of nonhuman systems. Human societies and natural systems don't just co-exist, they are in a dynamic, entangled relationship.

Each of these critiques come from scholars who associate themselves with political ecology. However, unlike Blaikie, Cannon, Wisner, and Davis, they are *post*-structural in their orientation. Post-structural political ecology, which utilizes post-Marxist critical theorists such as Gramsci, Adorno, Hall, and Foucault, is more than a political economic analysis of environmental processes. It draws on the ways in which nonhuman systems interact with, and are given meaning by, society. These meanings, in turn, have concrete manifestations within social and environmental phenomena. This branch of political ecology also draws on the work of science and technology scholars such as Bordieu, Haraway, and Harding to examine the intersections between environment, technology, and society.

As I will discuss in greater detail below, the concept of technocratic modernism (from science studies) and the conceptual framework of discourse analysis (from critical theory) both provide tools which are essential to bridging the gap between the physical and social aspects of hazards and disasters. They also offer ways in which the emerging field of climate change studies can help disaster scholars move beyond the nature/culture separation.

1.7 Discourse analysis: The assembly and contestation of meaning

The collective meaning-making which societies undertake is discourse. Discourse is the assemblage of ideas, connotations, and norms practiced within society to assign meaning to social and physical phenomena (Duncan 1993; Foucault 2000; Hajer & Versteeg, 2005; Hall 1992).

Discourse is more than conversation; it is both a system and a process of meaning-making which governs the narrative representations of social and physical phenomena, with the critical components including cultural norms, systems of communication, and the material consequences of these norms and communications.

Multiple discourses can operate within a given society at any given time, which people use to contest shared meanings and narratives. The dominant, or hegemonic, discourse, the one which is associated with the "mainstream" of society, often is reinforced by, and serves the interests of, the people who are most powerful within a society. Discourses are not deterministic, so the existence of a particular discursive assemblage within a society, or even its association with the members of a particular social group, does not always mean that the members of that group subscribe to a set of discursive meanings. Discourses - both dominant and alternative - are often contested with the use of other discourses. Maarten Hajer refers to this as argumentation, the ways in which the contest for social power is fought on the level of ideas and social meanings (Hajer 1995).

This interpretation and use of the term discourse was popularized by Michel Foucault, who sought to describe the exercise of state power. On the one hand, Foucault argued, the state has a monopoly on violence and the use of force, but this cannot fully describe the way that the state establishes and controls its territory and citizens. This is similar to Antonio Gramsci's idea of hegemony, whereby power is exerted through the power of shared ideas that citizens subscribe to regardless of their own self-interest.

Foucault's notion of discourse was the deployment of what he referred to as "discipline" or "micropower", wherein the desired power relations of the state are manifested through the organization of ideas on the subconscious level. Meaning within society is arranged into a plurality of discourses, which variously complement and contrast with one another, and many contestations of power are fought with the deployment of competing discourses within this plurality of meaning. The organization of the individual within a discourse occurs when one's own perception of freedom is constrained by acceptable actions within a discursive structure; Foucault refers to this as conduct and argues that "to govern, in this sense, is to structure the possible field of action of others" (Foucault 2000, p. 341).

By structuring the field of action in this way, individual members of society internalize the power structure and manifest it in their own beliefs and actions, which, in the collective sense, is both the product of and the reinforcement of discursive power. The individuals who resist the exercise of this power develop and deploy counter-discourses in the pursuit of change, which Foucault refers to as a "relationship which that is at the same time mutual incitement and struggle; less of a face to face conflict that paralyzes both sides than a permanent provocation" (2000, p. 342). Power is defined relationally, and disciplines are identified through asymmetries of power that reinforce the dominant discourse - he even goes so far as to argue that a power relationship can

only occur when one or more subjects are physically free but willingly submit to the constraints imposed upon them by the power relationship.[3]

The contestation of political topics rests on shared understandings of how society does, and should, function. This substrata of meaning is invoked through references to acts recent and historical, shared meanings and quotidian realities, and the invocation of stereotypes and norms. In the case of climate change in the United States, the political struggle plays out on a landscape of meaning with deep historical roots, only some of which is obvious to the casual observer. For example, one of the main challenges for scholars is the way that preponderance of data regarding climate change has not translated into public action; this confusion rests on the assumption that scientific information is contested in purely rational terms divorced from larger social meanings (Adger et al., 2009b; Brown 2013; Burton, Huq, Lim, Pilifosova, & Schipper, 2002; Clarke & Star, 2008; Hulme 2009, 2010; Hunt & Watkiss, 2011; Watson-Verran & Turnbull, 1995).

However, while on one side of the debate a narrative emerges of science battling ignorance, those skeptical of action on climate change invoke a common *fear* in the United States of assigning scientific authority to an elite class, a fear which is rooted in hundreds of years of populist anti-science rhetoric (Bozeman & Sarewitz, 2005; Jasanoff 1995, 2009; Sarewitz 1996; Schattschneider 1960). This fear is built upon a growing sense of cultural unease regarding the historical constructions of privilege and difference which are, people believe, challenged by having to think about carbon emissions, the plight of people in low lying island nations, or the complex web of personal responsibility constructed by global environmental politics.

Likewise, discussions of values and norms are often sidestepped in United States politics through the artificial construction of "science" vs "politics". Yet as any scientist would admit, interpretation of data rests on a number of non-objective factors characteristic to individual scientists and the overall scientific establishment as a collective. "Politics", which is often a pejorative term applied to the discussion of shared social values, is what gives science meaning. However, the debate is structured in such as way that one side claims "science", the irrefutable, in contrast to the "politics" of the other side, as a way to avoid having conversations about meaning.

Interpretive social scientific analysis gives us tools to understand both how the conversations about meaning take place in society (both consciously and subconsciously) and how and why they are avoided. While a positivist approach asserts the dominance of a single, universally definable "truth" of how the world operates, constructivist or interpretive approaches argue that truth is interpreted through the lens of human experience, society, culture, values, and norms. Importantly, a wholly positivist approach to knowledge does not accommodate the multifarious ways in which people assign meanings to events and processes. Positivist and constructivist approaches aren't automatically mutually exclusive; one can recognize the existence of objective, independent material realities while also recognizing that society affects human understanding of what is or is not reality, why these realities are important, and how these realities could change for the better. In social science, this approach is known as critical materialism.

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3. This leads to Foucault's controversial argument that slavery is not a relationship of power when the slave is in chains.

Employing discourse analysis as part of critical theory does not assert that the individual, or the group, defines material reality through discourse, or that, as some postmodernists might argue, reality is immaterial and contingent upon human experience and definition. Material reality exists, just as the agency and independence of nonhuman creatures and processes exist. Rather, the human experience of reality is filtered through layers of meaning - and *meaning is created by individuals and groups*. The assemblage of meanings that humans employ to make sense of the world, and the ways in which those meanings affect material reality, is what constitutes discourse. By employing the lens of discourse, one can analyze the ways in which even apparently trivial interactions with other individuals can become freighted with sociocultural meaning and significance. Gramsci's notion of hegemony is a way of describing the way discursive power is reproduced both materially and psychologically. To take white supremacy as an example, this hegemonic discourse was perpetuated through rules that prevented nonwhite citizens from owning homes in wealthy areas of town, which in turn affected the intergenerational accumulation of wealth. Because the doctrine of white supremacy is reproduced psychologically as well as materially, one finds both the normalization of white privilege among whites (for example, the way that African-American poverty is associated with laziness rather than centuries of systematic abuse) and nonwhites (for example, duBois' descriptions of black self-doubt and double consciousness).

Gender is another helpful illustration of the discursive construction of meaning. Judith Butler invokes the concept of "citationality," from literary theory to illustrate the performative aspects of gender identity. "Gender" as it is popularly conceived in many industrialized countries is effectively a performance of the social construction of gender, invoking socially constructed gender roles through subconscious citations to a shared idea of how people of different genders should behave, dress, and think. In this way, gender is a performance of one's role within the discursive construction of gender, rather than an innate expression of a personality. More importantly, not adhering to the appropriate concepts of gender within one's performance is to invite social censure that can come in the form of negative social interactions or even physical punishment. Butler's idea of citationality illustrates the way in which terms, which appear otherwise inoffensive, are freighted with the hidden discursive baggage of historical conflict (Butler 1990).

Without discourse analysis and critical theory, it is difficult to identify and describe shared meanings which shape phenomena in society on the level of informal communication and shared ideas - meanings which are not encoded in laws but shape the human experience in equally, if not more significant ways. This is particularly true when studying the myriad ways in which society regulates social difference. In the case of disasters and climate change, discourses mediates, for example:
- Which people are regarded as "vulnerable" within an assessment of hazard
- Whose interests are regarded as relevant to political contests over adaptation to and mitigation of climate change
- What types of social catastrophes are regarded as "disasters"

And of course, the two doctrines - disaster exceptionalism and "natural" disaster - are the products of larger discourses about nature and political responsibility, and these discourses are used to *reinforce* those doctrines. By unpacking these discourses within the context of climate-related disasters, I hope to disrupt the intimate linkages between these discourses and these fallacious yet powerful conceptions of how disasters work.

1.8   Methodology and Data

1.8.1 Methodology

Any research project is employs methods to gather and analyze data, but these methods are guided by methodology, the foundational logics and assumptions that validate those methods. I purposefully distinguish between methods, the operational practices of collecting and analyzing data, and methodology, the philosophy of knowledge and knowledge production which both structures the collection of data and validates the conclusions generated by that data. Each chapter employs slightly different methods to explore a different facet of the aftermath of Hurricane Sandy and the lessons this disaster holds for the understanding of climate-related disasters more generally. Each chapter's methods are reviewed in the chapter itself, but the project as a whole is guided by a methodology - an epistemological philosophy of research validity - rooted in (a) the extended case study method and (b) the political ecology approach. The former, extended case study, structured how I conducted preparation for, and data collection during, my seven months of field work in New York City in 2013. The latter, political ecology, is the analytical framework which guides the conclusions which I have drawn from my data collection.

This project is a qualitative investigation applying an adaptation of grounded theory called the extended case study method, a reflexive approach first described by Michael Burawoy (1998). Grounded theory uses participant observation to shape the study, allowing the context to lead the development of the project (Glaser & Strauss, 2009). It generates theory from data only, and does not apply any pre-existing theory to research design. This has been applied to my "data first" collection approach, where the available data is used to focus the parameters of the investigation. In this case, grounded theory methodology has led me to my use of discourse analysis to analyze the contested meanings of disaster in an era of climatic change.

However, while most grounded theory investigations are focused on a case-specific ethnographic analysis, I am seeking larger patterns in terms of how actors deploy story-lines and discourse coalitions to achieve political goals (Hajer 1995). Extended case study uses participant observation to locate a case study within a larger generalizable context, and forms a compromise between a data-driven grounded theory investigation and the desire for wider applicability. Rather than building exclusively from observation, the extended case study begins with a theoretical investigation *via* empirical observation, using the local and specific to illustrate broad patterns. Thus this method offers more significant external validity than a pure grounded theory investigation might offer.

Burawoy invokes reflexivity as the study approach. Recognizing the *intersubjectivity* of the investigator and the case study, extended case study assumes that the research design will be influenced by theory. Both collection and analysis will commence an iterative process between theory generation and data analysis. This reflexive approach is also championed in science and technology studies, most prominently by Donna Haraway (1988), Alison Wylie (2001), and Sandra Harding (2004). Burawoy's focus on "extended" application pushes the investigator to see the case study as emblematic, not ethnographic. To seek the generalizable lessons underpinning my case study, I use discourse analysis to identify larger patterns of social thought and political maneuver, and I use political ecology to put these patterns into broader context.

Political ecology is an interdisciplinary analytical framework that draws on cultural anthropology, geography, development studies, political economy, ecology, and critical theory to examine dynamic relationships in socio-ecological systems. The primary loci of analysis in political ecology are social difference, scale, power, and history. It makes the following assumptions: (a) human societies and their environment interact with, shape, and are mutually shaped by one another; (b) both human and non-human agents are capable of acting freely in non-deterministic ways; (c) the meanings which humans assign to environmental phenomena are socially mediated; (d) critical analysis of these mutually constitutive processes - both between humans and nonhumans and between individuals, institutions, and society - facilitates political action.

Underlying these assumptions is an implicit normative (and political) orientation that privileges the experience of subaltern groups and an anti-oppression and anti-exploitation agenda. Political ecology is not an all-encompassing theoretical orientation; instead it is an analytical approach that accommodates a range of methodological approaches. Likewise in an academic context political ecology is a community of practice that includes a broad range of disciplines (Collins 2008; Forsyth 2001; Le Billon 2001; Peet, Robbins, & Watts, 2011; Robbins 2012; Zimmerer 2010).

Political ecology's analysis of power and inequity leads to an implicit normative orientation, in which "attention to power highlights issues of distributive justice in relation to natural resources (environmental "goods") and degradation (environmental "bads" or harms), bringing attention to the needs of excluded or marginalized groups" (Allison 2009, p. 97). A normative bias towards distributional justice also means political ecology analyses tend to be pragmatic with regard to theory, identifying theoretical constructs through their manifestations in society and their effects on the material reality of everyday life. Therefore my approach (a) rejects the binary division between nature and culture; (b) asserts that distributional justice is positive for society; (c) recognizes that social difference (along axes of race, class, gender, and ethnicity) mediates access to environmental benefits and exposure to environmental harms. I use discourse analysis as a tool to explore the connection between power, meaning, norms, and change in the context of a climate-related disaster.

1.8.2 Data sources

My analysis draws on my years as a resident in New York City, in particular seven months of field research in 2013. I conducted over a hundred and fifty hours of observation of the city

government in action as well as local community groups, aid agencies in establishment (e.g. FEMA, Red Cross) and non-establishment (e.g. Occupy Sandy) circles. I drew on a database of public reports and analyses of the post-Sandy reconstruction process which is publicly available at www.superstormresearchlab.org, my research group's website. Additionally, as a member of the Superstorm Research Lab, an independent research collective based at New York University but containing members from a range of institutions, I participated in the joint collection of 85 in-depth interviews of stakeholders from four groups: city officials, representatives of community-based organizations, first responders (including Occupy Sandy affiliates), and affected residents.

The breakdown of membership in these groups is summarized in the table below. As indicated, several of the 85 interviewees fit more than one category.

	Total	Dual-categorized		Totals by category
Non-governmental resident community leaders, including organizational representatives and church leaders	17	2		19
Governmental representatives	13	4		17
First responders and relief volunteers, including representative of Occupy Sandy	41	9		50
Local residents immediately affected by the storm	26	7		33
TOTAL in all categories	97			

Complete transcripts for nearly all of the interviews, and all of the interviews cited in this dissertation, are freely available through the website superstormresearchlab.org

1.9   Overview of the following chapters

This chapter has laid out the foundational ideas of discourse, disaster, construction of nature, and relations of power that underlie the rest of this work.

Chapter 2, "The Hazardscape of New York City" extends these foundational concepts in relation to my case study. I begin to explore Hurricane (or Superstorm) Sandy as a catalytic event with the potential to change public discourses around climate change, disaster, vulnerability, and resilience in both urban and non-urban contexts. However, to understand the meaning and significance of the storm event, it has to be put in the context of history and power in New York City. I introduce the metaphorical construction of a *hazardscape* to unify the physical hazards of a particular place with the socio-politically determined relationships and power structures mediating those hazards.

Through the holistic notion of a socio-ecological hazardscape, patterns of vulnerability and resilience emerge which are the product of a combination of physical and social factors. The city as a built environment and a social landscape does not emerge in parallel with the physical landscape, it emerges in response to it. Likewise, the human choices structuring the city can have significant ecological ramifications. Human and non-human systems sharing the same place and time co-construct one another to manifest a systemic pattern of risk, resources, and responsibility in relation to real and perceived threats. The response to these threats can be analyzed within the larger patterns of power and difference that govern relationships within the city.

Chapter 3, "Climate Change and the Social Production of Vulnerability", continues this concept of social-ecological hazardscape to look more deeply at the citywide response to the disaster. Until the storm, the city's policies related to climate change had predominantly focused on mitigation - the reduction of greenhouse gases - rather than adaptation, changing the built environment or social process to anticipate future climatic disruptions. After the storm, adaptation immediately became a priority for the city's government and a topic of discussion in the media.

To put climate change adaptation in context, Chapter 3 explains how vulnerability is, in many ways, socially produced rather than a facet of the physical landscape. This means that adaptation policy needs to explicitly address the needs of the most vulnerable people as well as taking into account the social ramifications of proposed adaptive actions. I argue that there is a distinction to be made between adaptive actions that seek to reinforce the status quo, and adaptive actions which aim to address both the physical and social production of vulnerability.

To illustrate how vulnerability and resilience are products of social conditions, rather than physical circumstances, Chapter 3 draws heavily from the in-depth interviews done by Superstorm Research Lab, contextualized by my own observations. The key finding is the importance of *social* resilience to climate-related disasters, which is as important as physical resilience but rarely incorporated into policy approaches.

Chapter 4, "Adaptation Gaps in Policy and Practice", also explores the concepts of vulnerability and resilience in relationship to climate change, and introduces the connection between social difference, environmental risk, justice, and discourse. In particular, I introduce a conceptual framework, the Adaptation Gap, which can be used to incorporate concerns about socioeconomic inequality into adaptation planning.

Drawing on research in the field of environmental health, Chapter 4 considers whether the large-scale adaptation approaches which dominate the City of New York's post-Sandy planning could, in fact, be harmful to long-term social resilience. Discourse analysis of the first major policy proposals (the Special Initiative on Resiliency and Rebuilding Report) shows that the doctrine of natural disaster is the overarching theme within the city's approach, leaving social resilience behind. Looking at how the city government has implemented the SIRR Report's recommendations, I find that social resilience becomes more rhetorically prominent but is not supported by actual spending on disaster response in the four years since Hurricane Sandy struck. I also turn again to in-depth interviews to illustrate some fundamental failings of the

governmental response. Finally, I summarize what turning a social justice lens on climate change adaptation teaches us, in terms of making better, more equitable climate adaptation policy. There is still time for this kind of policy to be enacted in New York City, as part of the recovery from Hurricane Sandy.

In my final chapter, "Adaptation and Transformation", I return to the ways in which climate change and disaster might change public discourse on both climate adaptation and disaster response. Adaptation can be considered an ultimate "wicked problem", in which the dynamism of the problem itself makes it almost impossible to solve. Yet as many scholars point out, while disaster events are devastating, they are also opportunities in which to reconsider social relationships and, in particular, to redistribute power and make fundamental changes to public narratives about how disasters happen. If climate change is a slow-moving disaster, it may also be a chance to move beyond the restrictive patterns of social thought – the two doctrines - which hamper effective policy responses to climate related disasters.

2 The Hazardscape of New York City
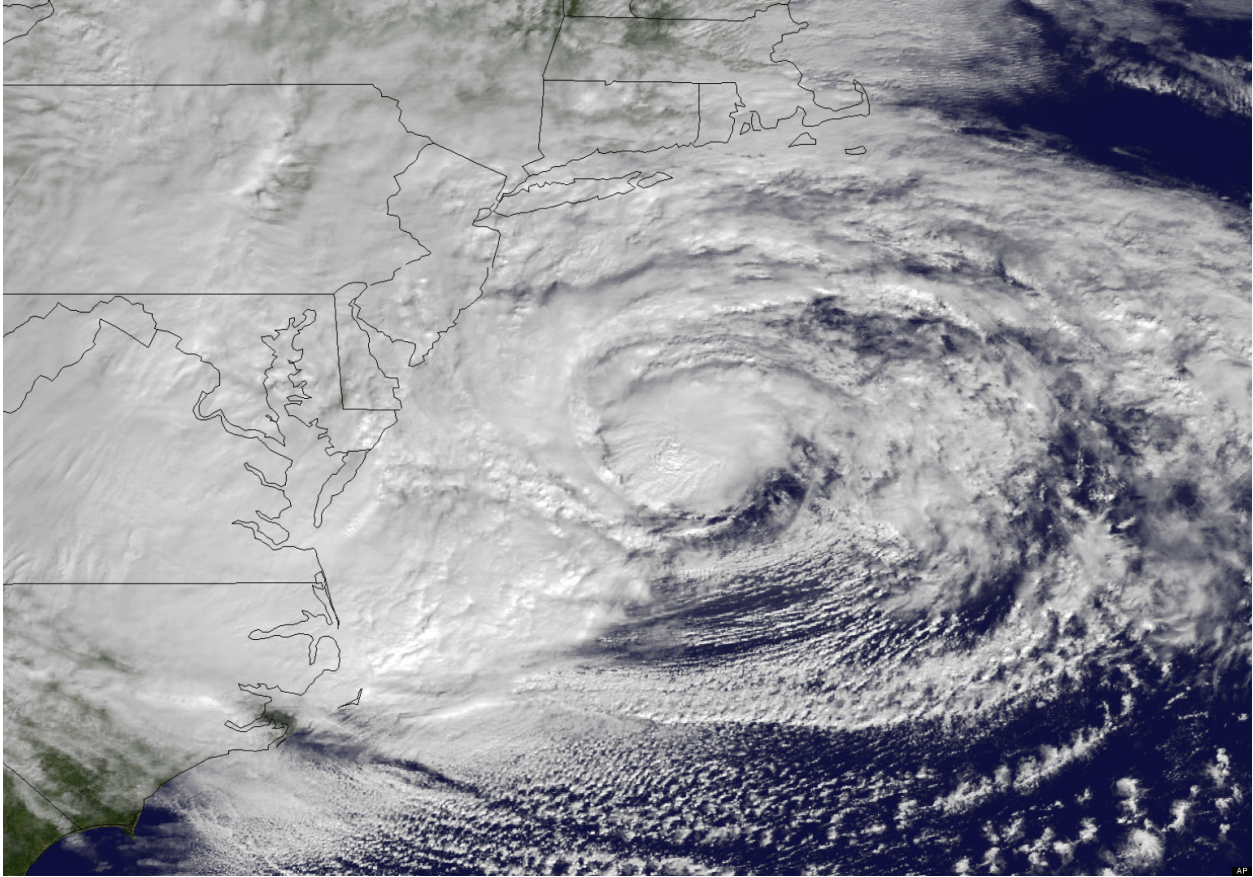
Figure 1: Satellite image of Superstorm Sandy before landfall. Image courtesy NOAA.

2.1 Representations of a Superstorm

Why was Sandy labeled a "superstorm" rather than a hurricane? Aside from the fact that Sandy wasn't actually a hurricane when it made landfall, and the affection for hyperbole shared by members of the news media, characterizing Sandy as a "superstorm" was both a meteorological conceit and a statement weighted with import. The reason for Sandy's severity in New York City was the extremely high tide, which was driven by the "spring" tide (an unusually high tide driven by lunar cycles) combined with the extremely powerful storm surge driven by the hurricane. (Sandy was, in fact, no longer a hurricane by the time it made landfall in New Jersey, it had by that time been downgraded to a tropical storm.) The immense size of the cyclonic event displaced an enormous amount of surface water, driving the tide, and coincided with a Nor'easter storm complex out of Canada which was tracking southeast towards the New York City region. The hurricane, nor'easter, and storm surge was an unusually powerful storm complex that, by some meteorological conventions, could be characterized as a "superstorm."

The media's characterization of "Superstorm" Sandy held a different character than that of the "snowpocalypses" of past storms. Connoted in the term was a sense of specificity and uniqueness,

calling out Sandy as a unique occurrence. In this, we might observe the doctrine of disaster exceptionalism at work, although it also coincided with the increased awareness that climate change was also to blame in this event - the "superstorm," then, was also a harbinger, a preview of the new type of climate driven storm. In this we can see the tension that underlies the intersection between climate-related disasters and the doctrine of disaster exceptionalism.

On the one hand, the unusually powerful storms driven by a changing climate seem to be uniquely destructive, a classification unto themselves. On the other hand, knowledge of how climate change drives changes in the hydrological system also carries with in the understanding that the average storm is going to become more powerful, making these "new" storms not unique but an early exemplar of a type of storm which will now become increasingly common. Whether the public characterizes the storm as one of a kind, or chooses to see it as a preview of future events, is what determines whether climatic change destabilizes the doctrine of disaster exceptionalism.

However, the significance of the storm goes beyond its discursive significance and its place in the growing roster of storms that are publicly connected with a changing climate. The choices made in the aftermath of the storm as to which neighborhoods were rebuilt, when and how, and - most significantly - how the city's coastal defenses should change in anticipation of climate related storms are very much a function of the city's history, social structure, and power dynamics. To fully understand these, I introduce the concept of hazardscape as a holistic framework in which to view this new type of environmental disaster in a specific and place-based way that, still, contains a number of generalizable lessons for climate change adaptation and urban sustainability.

Whether characterized as a hurricane, a superstorm, a disaster, a catastrophe, or a harbinger, Sandy was not only the intersection of a storm complex and an urban area any more than Hurricane Katrina was. Sandy is the preparation for extreme weather events before October 2012, it is the experience of the storm by those who lived through it directly and vicariously, it is the construction of a narrative via the news media and the contestation of that constructed narrative, it is the use of social media to share and distribute resources in a hamstrung city as well as to release photoshopped pictures of sharks in subway stations and false reports of looting. Sandy is the aftermath of the event, the changes that it produced in the popular and political conception of climate change, the injection of capital through massive public and private funds for recovery, reconstruction, and resilience.

Sandy is the collective opportunity to rethink how we conceptualize and prepare for urban disaster and it is the failure to take advantage of that opportunity. Like all significant crises, Sandy is both an event and a process, with the weather system in question being only one of an assemblage of physical and social forces, reactions, and meanings.

Figure 2: Seawater floods the September 11 Memorial site, which was under construction at the time. Unlike Subway Shark, this is an authentic and verified photograph. Credit: John Minchillo / Associated Press.

2.2 What is hazardscape?

What composes a disaster? There is the event - the environmental hazard such as an earthquake, hurricane, or drought - that stimulates a crisis situation. But for the event to constitute a crisis it must also be embedded within social processes. In the lead up to the disaster, this constitutes the way societies think about the potential hazards posed by the place that they live in, the importance given to such hazards, and the choice a society makes to reduce its exposure and mitigate hazardous events when they do occur. Likewise, after the event has occurred the disaster also encompasses the choices made by society in response to the disaster, both in the short term - such as immediate recovery and rebuilding - and the long term, including the choices that might be made to anticipate future crises and manage them better. Thus the aftermath includes both *recovery* and *adaptive choices*.

To think about the disaster as both a process and an event, embedded within a larger set of social relationships, it is useful to think of any given disaster in a range of potential hazardous events, as a particular manifestation of the landscape of hazard. This landscape encompasses the disasters which could occur, as well as the society which must cope with those hazards. This holistic approach to thinking about hazard, embedded in social processes and a particular place, is known as *hazardscape*.

2.2.1 The development of the concept

Mustafa (2005) links the idea of hazardscape to political ecology, cultural geography, pragmatism, and the idea of "socionature". A brief chronological survey of hazardscape's emergence in the disaster literature reveals additional links to human ecology, political science, and quantitative geography. Corson (1999) originally used hazardscape as a term of art to refer to "the spatial distribution and attributes of human engineered facilities such as industrial plants, military bases and power stations that contain or emit substances harmful to humans and the environment" in West and East Germany. To analyze the comparative impacts of post-Soviet industrialization and pollution, Corson needed to expand the idea of disaster beyond even Erikson's "new species of trouble" which, as noted above, still occurred at well-defined geographical and temporal scales (Erikson 1995). Corson aimed to examine a suite of hazards embedded within a unique political context which had given rise to, reinforced, and was now threatened by these hazards. Nonetheless his approach to the problem, like many other disaster scholars', was still resolutely technocratic, and did not fully encompass the interpellation of socially and physically contingent hazard.

The term was popularized by Susan Cutter's (2001) edited volume *American Hazardscapes*, as well in several other papers released by Cutter and her collaborators. Cutter, Mitchell, and Scott defined hazardscape as "the interplay of social, political, and economic factors--interacting separately, in combination with one another, and with the physical environment--create[ing] a mosaic of risks and hazards that affect people and the places they inhabit" (2000, p. 715) - this is essentially a shorthand for the hazards of place concept proposed by Cutter and Solecki (1999). Cutter et al.'s notion of hazardscape incorporates an emphasis on not just the political construction of hazard but its distributional logic, corresponding to a number of other hazard models such as the Social Vulnerability Index (Cutter et al., 2003). Echoing Erikson (1995), Cutter, Mitchell, and Scott refuted the idea that hazard and disaster could be physically or temporally isolated: "the distinction between natural and technological hazards is now blurred, with hazards viewed as a continuum of interactions among physical, social, and technological systems" (Cutter et al., 2000, p. 715).

Nonetheless, Cutter and collaborators did not operationalize or concretely apply the idea of hazardscape. Instead, their articles leave the concept as a particularly useful heuristic (similar to hazards of place). This hazardscape-as-heuristic approach was useful for conceptualizing the ways in which different types of hazard and vulnerability overlapped and amplified one another, but it did not address the substrata of relationships and institutions that produced these overlapping patterns. Instead of trying to analyze the hazardscape itself, the lab's work concentrated on the Social Vulnerability Index, a quantitative spatial metric of overlapping hazards with proxies for social vulnerability such as poverty and infrastructure (Cutter et al., 2003). The Social Vulnerability Index could not include - and thus obscured - social relations of power, discourse, marginalization, and facilitation (Collins 2008).

By 2005, hazardscape was finally used as a link between power, politics, hazard, and disaster. Mustafa's definition, used in an examination of urban Pakistan, was "an analytical way of seeing that asserts power as a social-environmental space where the gaze of power is contested and

struggled against to produce the lived reality of hazardous places" (2005, p. 566). Hazardscape was no longer a heuristic, it was an analytical framework for analyzing the relationship between society and hazard. To an extent, this arose from Mustafa's analytical approach - rather than multi-hazard analysis, he focused on a single hazard (flooding) within a larger sociopolitical context. Nonetheless his work highlights the potential benefit of deliberate, applied hazardscape analysis.

Mustafa invokes the idea of "socionature" as underlying hazardscape, noting that one can recognize the independent materiality of environmental phenomena while recognizing that it is our individual and collective perceptions of these phenomena that give them meaning within society (Braun & Wainwright, 2001; Chamlee-Wright & Storr, 2009; Demeritt 2001; Oliver-Smith 1999a; Swyngedouw 2010; Tidball 2012).

> "Hazardscape therefore fuses the material and discursive aspects of how hazardous spaces are produced, contested, and struggled over... Hazardscapes are therefore constitutive of the ideological filters used to view hazardous spaces and the produced social spaces where those ideologies are contested and struggled over." (Mustafa 2005, p. 570).

The subtlety of Mustafa's discursive approach, his refusal to oversimplify power relationships within the watershed (e.g. "The stories of the Lai flood plain residents are not illustrative of the superiority of some romanticized indigenous knowledge of which the Lai flood plain residents are the receptacles", p. 572), compliment a quantitative analysis using a public survey of residents. In this, the spatial-analytical tools of Cutter's group are paired with the qualitative richness of critical analysis.

Yet as Khan and Crozier (2009) point out, Mustafa's approach echoes Kasperson et al.'s "social amplification of risk" (Kasperson et al., 1988). As such, the external causative agent and the socio-economic context of a given hazardscape are separated. To fully encompass the dialectical relationship between human society and its surroundings, hazardscape also needs to (a) capture the historical material-cultural relationship between hazards, choice, and the social environment, and (b) focus on relationships and process rather than try to analyze a "snapshot" of a given place at a given time.

Thus a critical hazardscape framework needs to recognize the inextricable links of socionatural landscapes, see hazardous events and the production of hazard as a series of processes and relationships, and encompass multiple temporal scales. In work by Khan, Crozier, and Kennedy, hazardscape becomes "a dynamic scape that reflects the physical susceptibility of a place and vulnerability of human life and assets to various hazards within a given human ecological system" (2012, p. 505). Significantly, Khan et al's formulation includes the relationships between humans and the landscape (Khan & Crozier, 2009) while recognizing that there is a difference between the material reality of the hazardscape and the subjective individual experience of the hazardscape: "human response is based on the perceived hazardscape which is constrained by a number of factors, such as awareness or accessibility of knowledge" (2012, p. 506). Through this application of critical materialism, Khan, Crozier, and Kennedy manage to avoid the binary

questions posed while establishing that there is a socially contingent boundary between what hazards do and don't reasonably fall into the category of hazardscape.

2.2.2 Hazardscape, development, and political ecology

The need for the hazardscape concept is highlighted by work coming out of international development literature, where practitioners and scholars alike are debating the relationship between climate change adaptation and disaster risk reduction (DRR). Mercer (2010) traces this back to the disciplinary origins of adaptation (in ecology and socio-ecological systems) and DRR (in development practice and humanitarian aid). The location of climate change adaptation within the larger scientific establishment created a disconnection between those studying and advocating for adaptation as a priority and those who are already being affected by climate changes (2010). Writing as someone who sought to raise adaptation as priority in the development practice context, I can also attest to the resistance of that community to include future climatic changes into long-term strategy. The development community tends to see hazards and risk as "somebody else's business" (Christoplos, Mitchell, & Liljelund, 2001). Likewise the disaster risk reduction community tends to ignore the importance of livelihoods and poverty reduction as a strategic intervention, choosing instead to focus on technocratic approaches (2001, p. 192) - a bias which is echoed in New York City's own post-Sandy redevelopment plans (Bergren et al., 2013).

The intimate linkages between poverty and hazard have been extensively documented in both a developing and a developed country context (Akter & Mallick, 2013; Brooks, Neil Adger, & Mick Kelly, 2005; Cox et al., 2006; Hartman & Squires, 2006; Thomalla, Downing, Spanger-Siegfried, Han, & Rockström, 2006; Wisner 1993; Yoon 2012). As Mercer notes, "the focus should be upon risk reduction within the context of wider sustainable development, considering all the interrelated factors affecting a community, both positive and negative... Whilst the difficulties of integrating the wider socio-economic environment, hazard assessments and decision-making processes are accepted, it is just such an integrated, holistic approach which is most needed in order to further community development and reduce vulnerability" (2010, p. 260). This holistic framework is hazardscape. As Khan and Crozier note,

> "Hazardscape...demonstrates the ecological perspective of hazards and consequent risks, which build through a constant, implicit and intricate relationship between human beings and the environment in a particular spatio-temporal context. It conveys the underlying fact that hazards were never separate either from the people or the place" (Khan & Crozier, 2009, p. 4).

The current scholarship on disasters and climate change treat these phenomena as independent lines of inquiry, even though these two respective phenomena are entangled with and co-shaping one another. As I will describe in a later chapter, New York City-based advocates for social justice and the local climate movement united around the post-Sandy issues that arose during the rebuilding process, co-enrolling one another into what at first seemed to be separate political agendas.

The same process could, and should, be occurring between the climate change and hazards communities, as insights from each field can help resolve problems posed in the other. The methodological approaches of political ecology and critical theory can be used as a bridge to explore the social dimensions of these two phenomena and bring the fields into closer conversation with one another, although to do so requires a shared conceptualization of how hazards are socially embedded, dynamic processes. This bridge, then, is built on the hazardscapes that lie under disastrous events.

The scholarly literature around climate change has its roots in the physical sciences, rather than the social sciences. Warnings about the potential consequences of climate change were originally made by atmospheric chemists and echoed by biologists and ecologists; the field continues to be dominated by examinations of the physical aspects of the phenomenon (Adger et al., 2011; Aerts & Wouter Botzen, 2011; Brown 2013; Brown & Westaway, 2011a). However, climate change first became prominent in international policy discussions with the 1992 UN Conference on Environment and Development in Rio de Janeiro, which established a framework for the UN Framework Convention on Climate Change within a larger program of uniting economic growth, environmental sustainability, and increased cooperation between rich and poor countries in the wake of the USSR's collapse. Therefore the social and policy aspects of climate change, at least on the international scale, have often been considered in tandem with international development priorities. In particular, it is worth noting the major political debates around issues of justice and inequality, the intersection of climatic and economic concerns, and the mainstreaming of climate change into disaster risk reduction strategies.

These issues all intersect with the concerns of political ecologists, back to Blaikie and Brookfield's work on soil erosion in 1985 which is a seminal work establishing environmental degradation as a social function rather than an ecological one (Blaikie 1985a). Blaikie and Brookfield tied the long-term decrease in agricultural productivity in developing nations to the way in which poorer farmers had been displaced by wealthy elites onto already-marginal land. Because the poorer farmers were, by dint of necessity, forced to exploit poorer soil beyond its agricultural capacity, the marginal lands were quickly exhausted. The solution to the soil erosion problem, then, was increasing the availability of richer agricultural land for subsistence production, rather than initiating the cycle of artificial inputs and highly mechanized production which characterized "Green Revolution" agricultural approaches.

Blaikie and Brookfield and other political ecologists of the 1980s offered empirical evidence connecting purportedly "environmental" problems to larger social processes driving environmental change, showing how human and nonhuman agency worked in tandem. Nonetheless, decision-makers in development studies and ecology continued to emphasize the physical drivers of change rather than the human ones, in exactly the same way that disaster scholars and disaster planners do with regards to hazard (Pelling 2001; Robbins 2012; Wisner 2004).

2.3   The Coincidental Order of Environmental Injustice

Through an analysis of discourse we can see how social meanings are ascribed to Sandy - it is not just a hurricane, it is a "Superstorm", a freak occurrence which could not have been predicted and planned for, despite the New York City Panel on Climate Change and the Metropolitan Transportation Authority predicting its likelihood. And of course, there was the near-miss of Hurricane Irene the year before. Likewise, the social traumas associated with slum clearance, the development of public housing tower projects and the sequestration of the poor, the construction of the interstate highway system and other major infrastructure projects which retrenched patterns of social marginalization, all combine to put the storm-as-event into a much larger social context of oppression and the exercise of both capital and political power.

Discourse analysis already shows a clear instance of the two doctrines. The doctrine of disaster exceptionalism undergirds the construction of Sandy as an extreme and unpredictable hazard. The doctrine of natural disaster separates the social element from the event and its aftermath, rendering the catastrophe ahistorical and asocial.

This process – the way that the two doctrines both emerge from, and are reinforced by, popular narratives of disaster - is part of a much larger pattern that has played out at the national level in the United States and other countries around the world. The way that local and community groups in the city contest the meaning of Hurricane Sandy, in particular, sits in a larger continuum of struggles for environmental and social justice. The efforts to re-create climatic disasters within their social and historical context is, in effect, a form of resistance to the hegemonic structure of power.

As the application of the hazardscape and political ecology lenses shows us, these struggles are not parallel, but one and the same, producing a "coincidental order of environmental injustice" (Romm 2001). Referring to it as coincidental both invokes the common notion of coincidence (a random happenstance) and the deeper meaning, co-incidence, a set of incidents that happen together, creating deeper meanings and ramifications.

"Coincidence" also highlights the way that environmental injustices are commonly perceived as apolitical, ahistorical situations but are in fact the products of, and legacy of, profoundly non-random historical social structures. In the United States, this is derives from the colonization of the land, the genocide of the Native Americans and First Nations under the doctrine of "Westward Expansion", the forced transport and enslavement of African Americans, the economic servitude of a race-delineated underclass once slavery was abolished, all of which served the tandem interests of white supremacy and the accumulation of capital and political power in that white elite.

As one historical illustration, Romm cites the pattern of land ownership "haves" and "have-nots" in the United States in the post-Civil War period. Homesteading lands in the Western states, which had been made safe for white settlement through the eradication of previously resident tribes, were offered free to any white person or family who agreed to settle on the land and subject it to "agricultural" improvement for some set period of time. The claiming of these Western lands by the white urban underclass to build their own agrarian futures is part of our national mythology, liberated from its genocidal and racist associations. Yet at the same time,

freed slaves were not eligible for these homestead properties, nor were they allowed to claim the lands that they had once farmed in servitude.

While Native American ownership claims were rendered meaningless through the use of legal and military force, the property rights of white plantation slave owners - the same plantation owners who had only recently mounted an unsuccessful war against their own government - were sacrosanct. If the freed slaves wanted access to land, they had to purchase it. Since slavery is an economic status that does not facilitate the accumulation of private wealth, very few people were able to do so, instead choosing to work the land as sharecroppers. When African-Americans did purchase land in the South, it was generally the least fertile areas that could be purchased at a low price. This pattern of historical dispossession is intimately linked to the continuing lower socioeconomic status of African-American people. Moreover, it demonstrates how *environmental* vulnerability – in this case, access to safe and productive land – is often the product of historical patterns of marginalization.

Like any form of governance and territorial control, environmental governance is manifested through a series of physical and social restraints which govern who, when, where, and under what circumstances people can access environmental resources (Pulido 2000; Ribot & Peluso, 2003; Romm 2001). In the United States, these restraints are both produced by, and reinforce, larger patterns of social hierarchy and dominance which combine to serve the interests of the powerful - those who have political power and access to the rule-making apparatus - at the expense of the groups who are not deemed worthy of power, such as the poor, women, and ethnic or racial minorities.

Marginalization through both informal and formal means has material consequences that echo through generations, particularly when those consequences are enabled through social policy (Anderson 2007; Ford 1995). In the USA, regressive tax policies, the lack of a functional social welfare net, and comparatively low taxation on unearned income (such as that from investments and inheritance) forms a legal structure which enables a widening gulf between social classes. This gulf is compounded by the long history of racial discrimination that has made it particularly difficult for nonwhite ethnic groups to build wealth over time through the accumulation of assets.

As nonwhite groups were excluded from home ownership in many parts of cities and towns, ethnic enclaves grew up in which the houses were less valuable. Likewise, local authorities invested less in infrastructure and infrastructural maintenance in these "less desirable" areas, perpetuating the low valuation of these neighborhoods through lack of amenities. While these practices have been technically illegal for the past 50 years due to the legal successes of the Civil Rights Movement, continued litigation under the Federal Fair Housing Act (1968) and Title VI of the Civil Rights Act (1964) demonstrates that housing discrimination is still a major problem. Through the devaluation of these neighborhoods, residents have less opportunity to pass wealth on to their descendants or accumulate wealth through home equity, which in turn leads to less access to political power and economic opportunity, which in turn makes it harder for people living in these areas to effectively resist the siting of environmental "bads" in these areas or advocate for further amenities through environmental "goods". "The combination of restraints

concentrates social control of the environment in dominant groups and transfers the consequent problems toward those who lack access to compensate for them" (Romm 2001, p. 119). As a result, "These restraints embed the power and interests of those in positions to define them." These circumstances are the larger social context for the discursive construction of urban neighborhoods as "un-natural" and the forced displacement associated with infrastructure and other major physical-social projects.

The framework of a "coincidental order" - the tacit, yet material connections between forms of social restraint and forms of environmental restraint, and the way that these restraints intersect to create a pattern of social hierarchy and privilege - also helps to explain how the exercise of power obscures itself. Resistance to environmental inequalities are framed as part of an environmental struggle, whereas resistance to social inequalities are framed as part of a separate, and parallel, struggle for social justice. Yet although these resistances are intersecting and mutually reinforcing, the parallel discursive framing makes it difficult to articulate and highlight those interlinkages, offering power-brokers the opportunity to sideline concerns which apply to the "other" discursive framework.

This pattern can be seen playing out in any number of socio-environmental conflicts. The classic example of environmental injustice is the tendency of environmentally harmful infrastructure - such as chemical waste dumps, freeways, bus depots, and sewage treatment plants - to be sited in neighborhoods which have predominantly ethnic minority - especially black and Latino - residents.

The counterargument to local organizers' accusations of racism is that the planners and public utilities simply made the most rational choice: knowing that their environmental hazard would cause damage (both directly and indirectly through the reduction of property values), they chose the areas in which lower average salaries and lower average property values would reduce the cost of adverse court judgments. Implicitly, there is also the connotation that the lower-income communities also have less political power to resist new environmental risks through the political process, or even that they would welcome the potential harms given the potential additional benefits through property taxes, philanthropic donations from the company in question, or increased local jobs. However, as described above, the distribution of property values is not an ahistorical process. The decision of the company and its agents to "rationally maximize" its financial risk is predicated on the long-term marginalization of black and brown bodies in particular and the poor more generally. As Eric Avila puts it, "highway planners, like others charges with the responsibilities of planning and managing cities, targeted not people of color but the spaces in which they lived" (2014, p. 43). Through the lens of social geography, it becomes clear that the spaces in which environmental changes take place, with positive or negative intentions, are neither ahistorical nor asocial.

2.4 Intersections of Power and Place

How, then, do these patterns of environmental vulnerability play out in New York City? To put the public conversation that arose in Sandy's aftermath into context, we have to consider the demographics and history of the city itself. As Gregory Simon points out, space is in and of itself

historical (2014a). Unlike many urban areas such as Los Angeles or Chicago which have more sprawling patterns and a network of commercial centers in addition to the dense urban core, New York is almost a core and periphery model writ large between Manhattan and the outer boroughs, with wealth and power receding the farther one gets from Times Square. Sandy recovery follows this pattern, with redevelopment and recovery happening much more quickly in Manhattan and areas of Queens and Brooklyn (for example, Long Island City and Red Hook) close to Manhattan, and becoming slower and more painful farther out in places like Bay Ridge, the Rockaways, and Staten Island.

Significantly, the proposals to adapt in the aftermath of Hurricane Sandy are almost all proposals for major land use changes rather than efforts to redress the geographical or class imbalances of power that give rise to differential patterns of recovery. They also do not address the many social factors contributing to urban vulnerability. To understand why, the following section puts post-Sandy adaptation into a historical context of land use and power.

The decades that followed World War Two in New York City, as in many other urban areas, were notable for the departure of significant percentages of white urban residents to less dense, suburban areas. This phenomenon, often characterized as "white flight" was driven by a number of factors including increased postwar prosperity and the GI Bill, racial fears (which were in turn supported by practices which formally and informally excluded nonwhite residents from these suburban neighborhoods), the connection between property taxes and school funding, and a lack of investment in infrastructure in the urban areas being left behind. Concomitant with these demographic changes was the phenomenon of letting urban neighborhoods, which were losing residents to the suburbs, languish through systematic disinvestment, which would, it was thought, encourage the remaining residents to move out and allow the neighborhood to be redeveloped for other uses. The New York City housing commissioner Roger Starr characterized this system in 1976 as "planned shrinkage".

Planned shrinkage, or as it is sometimes termed, "benign neglect", is an active choice on the part of city decision makers to reduce population in a given area through withdrawing services to "unpopular" neighborhoods, allowing infrastructure to decay, permitting noisome land uses in adjacent areas, reducing mass transit, and other selective uses of planning regulations to not only discourage the replacement of departing residents, but also encourage further population loss (Gratz 1994). The tactic can be undertaken in desperation[4], but in New York the city planners used it as a way to shape the city in ways that weren't otherwise accommodated by the democratic process, primarily because people felt a sense of attachment to their neighborhoods regardless of "blight" or poverty (Aalbers 2014; Avila 2014; Caro 1974; Schwartz 1992; Wallace & Wallace, 1998).

In the 1960s, this policy was supported by prominent think tanks and opinion-makers closely allied to the city's power brokers. For example, on representative report came out in 1967 from the Institute of Urban Studies at Fordham, which cited "space availability" as the major

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[4] See, for example, recent uses of the planned shrinkage concept in Detroit as a result of large-scale abandonment of certain areas.

impediment to business development in the Bronx. The report recommended razing 2500 homes, with an emphasis on those that were substandard or "blighted" to make way for more heavy industrial uses (cited in Wallace and Wallace 1998). This push was amplified by the work of the RAND Institute, which generally worked for the military-industrial complex but also had its own branch specializing in issues related to New York City.

RAND's work in the 1960s emphasized restricting the city's population - that is to say, the number of residents eligible for city services - while maintaining the city's tax base (Aalbers 2014). To do so, the number of poor residents in the city had to be reduced in proportion to the number of wealthy residents. It was thought that planned shrinkage would simultaneously achieve the goals of increasing industry in places such as the South Bronx, making more land available for upmarket redevelopment in places such as Manhattan, and encouraging the poorest residents to move elsewhere or become less poor through self-help (Wallace & Wallace, 1998).

Planned shrinkage was compounded by the development of public housing projects which took the form of massive multistory units which sequestered the poor away from the rest of the neighborhood - or, in the construction of city planners such as Roger Starr and Robert Moses, reducing the "footprint" of the poorest residents in a city where wealthier residents were in need of more space (Gratz 1994; Newman & Wyly, 2006; Wallace & Wallace, 1998). Additionally, "benign" neglect included the reduction of fire services at the same time that property costs plummeted in the South Bronx (as well as other "shrinking" neighborhoods), leading to a catastrophic string of arson-related fires in the city throughout the 1970s. Despite the planners' best intentions, policies of planned shrinkage, sequestering the poor, and reduction of public services led to a stark decline in quality of life in New York City by the 1980s. Although the city has recoverered, the era of neglect still remains in the public consciousness. Planned shrinkage was, and remains, the specter at the party of New York City residential development. More importantly, the most vulnerable residents continue to distrust the city government.

Despite the links between social resilience and overall resilience to environmental hazard described above, the city's policy continues to emphasize large scale land use changes as the overall solution to social problems, whether those problems are related to climate change or not (Cowan 2014; Rosenzweig and Solecki 2014). One example of how the city does this is discussed in the following section.

2.5   Past and future hazardscapes: Lessons from Arverne-by-the-Sea

   "This area is known as the Arverne area. It is one of the areas that had been heavily impacted but due to our history what we have noticed it wasn't focused on because the front end of it was, it is newly developed by Mayor Bloomberg and his people. And they developed it and put it approximately between six to eight feet higher than every other part of the Arverne area. So because they were not affected the only thing that we see they did, especially the first month or so, anyone that put out garbage on the main road it was removed instantly because of the people that lived on the other side of the line. They didn't want them to be effected by that. So the garbage was removed instantly. They put it out by day and by the night it was gone. We look

and when we just in the same area, same Arverne area when you get down to the streets behind the main road you'd put out the garbage and it stayed for three or four weeks before it'd get picked up.   Finally sanitation come down to pick it up, you know?" (Interviewee #1)

Figure 3: Map of the Rockaways Peninsula, New York City. Courtesy of Google Maps.

When you fly in to John F. Kennedy Airport, the main international hub serving air travel in and out of New York City, you approach along the coast, with one wing over the Long Island Sound and the other pointing at the distant skyscrapers of Manhattan. If you are lucky, the pilot will bank towards Lower Manhattan, and suddenly you will see that the city is like an archipelago, surrounded by water. In the right light, the bridges look like birds frozen in midair just before they hit the water. The bridges of New York City are international symbols of engineering, commerce, and urbanism - the Brooklyn Bridge, looking more like a castle than a transportation corridor, the enormous Verrazano Narrows, the eternally groovy Queensboro. But they are joined the other less famous, workaday spans - the Whitestone, the Pulaski, the Triborough, the Williamsburg - and a corresponding network of invisible tunnels, almost all of which flooded during Sandy. From the air, you can see how New York City is a port town and will always be, an ideal confluence of land, water, and natural shelter for sea commerce.

Figure 4: Advertisement for the new development at Arverne-by-the-Sea

If the pilot chooses to bank in the other direction, away from the gleaming glass and thronging multitudes in the densest part of town, you will see that the edge of New York is soft, sandy, and low-slung. Gentle waves move in from Long Island Sound and break on a long, narrow sandbar that might look like it came out of a vacation brochure. Sheltered behind that sand is the rich wetland of Jamaica Bay, a tidal estuary spanning the boroughs of Queens and Brooklyn, home to both a National Recreation Area and the airport you are flying into. Once you get close to the ground you may be able to spot a shorebird or two - a crane or a heron, perhaps. Without the natural breakwater of the sandbar, the sea would wash over the runways, slowly stealing back the land. The popular imaginary of New York City is veined by steel and subways, not sea grass and reeds. You would be forgiven for experiencing cognitive dissonance when you see the heron, the sandbar, the boardwalk, and the beach houses. This is the Rockaways peninsula, where New York City meets the Atlantic Ocean.

Near the middle of that peninsula are two contiguous neighborhoods that share the same name. While the semi-urban neighborhood of Arverne was built up many decades ago and settled predominantly in the post-war period, Arverne-by-the-Sea is a sprawling beachside condominium apartment complex that is so new it wasn't fully complete when Hurricane Sandy occurred in 2012. Aware of the development's proximity to the ocean and the latest scientific information about the potential for sea level rise and storm surge, the developers of Arverne by the Sea chose to go far beyond the planning guidelines in terms of protecting the development from storm surge, and as a result, while almost the entirety of the Rockaways peninsula was

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under water Arverne-by-the-Sea encountered no major problems with flooding. The land had been elevated, the drainage was extensive and had been designed to accommodate major storm-driven tidal inflows, and all went according to plan. However, my interviews with residents of the Arverne neighborhood showed that since the Arverne-by-the-Sea development had gone up across the road, flooding from storm water runoff had become an increasing problem. One resident informed me that she lived one block away from the development and as far as she could tell, the land had been designed to offload drained water directly into the Arverne neighborhood. "It's not in their backyard, it's in mine now! I get all their water!"

Whether the outflow from Arverne-by-the-Sea was intentional or not, it seems clear that the drainage system in Arverne was not upgraded to compensate for the newly-paved acreage of the development. The drainage system in Arverne-by-the-Sea worked extremely well for residents who could afford market-rate, upscale apartments that were designed exactly as climate-resilient residential development should be. However, neither the developers nor the city planners made any accounting for the nearby areas that already experienced problems with the storm drain system and suddenly found their homes no longer occupied the high ground. While I cannot prove that the Arverne-by-the-Sea development caused nearby Sandy-related flooding to become more severe, it is emblematic of a larger encroachment of "resilient" gentrified dwellings on pre-existing neighborhoods.

Figure 5: Arverne-by-the-Sea development, showing surrounding buildings. As the land was built up, runoff affected the nearby areas which had not benefitted from improved drainage systems. Credit: Perkins Eastman Developers

Because Arverne is a lower-income neighborhood with predominantly nonwhite residents, the Arverne-by-the-Sea development is also presented as a major asset driving the local economy - along with driving seawater into nearby backyards. While the water displacement could be framed as an engineering problem, it is actually the power imbalance between the residents of Arverne and the developers of Arverne-by-the-Sea that caused the problem. It is not considered the developers' responsibility to consider whether their storm-proof drainage will cause minor but conspicuous flooding nearby. If the city genuinely wanted to promote pro-resilience policies, there would be an obligation for the developers to extend anti-flood protections well into the surrounding neighborhoods, in conjunction with city planners thoroughly examining the nearby infrastructure and upgrading where necessary. However the boundaries of responsibility favor the developers (and by association the residents of Arverne-by-the-Sea).

In the aftermath of Sandy, the terms "resilience" and "adaptation" suddenly became part of the popular conversation. However, there is no clear agreement about what resilience or adaptation are, what they should exclude or include, or by whose standards they should be achieved. Throughout my fieldwork in 2013, it seemed to me that the term "resilience" was applied to any initiative that could potentially protect the city against future disasters related to climatic hazard. This chapter aims to interrogate the conceptions of resilience that arose in the wake of the storm, and explain how this conception of resilience connects to power relations within the city and its governing structure. While recognizing that the focal concepts of this chapter are adaptation and resilience, they are surrounded by an enormous and growing literature on attendant concepts. Resilience, vulnerability, adaptation, and adaptive capacity are all interrelated, and the contestation over them in academic and policy circles is so extensive it is important to note that this chapter deliberately draws from the literature relevant to climate change and disaster. While other fields (notably psychology and human development, ecology and socio-ecological systems, and disaster sociology) cover these topics as well, a full literature on these topics could be a dissertation-length work in and of itself.

3 Climate Change and the Social Production of Vulnerability

Within the overall heuristic of hazardscape, this chapter addresses the interrelated concepts of adaptation, vulnerability, and resilience. These ideas are major components within both scholarly and pratical approaches to climate change adaptation, and as I will describe in detail, these concepts are primarily describing social processes, rather than physical ones.

To illustrate how vulnerability is socially produced, I use selections from the in-depth interviews conducted by Superstorm Research Lab in the aftermath of Hurricane Sandy which represent the many ways that affected residents are ignored by policy responses. I argue that this is less a specific policy failing than a failure of discourse, in which our socially shared conception of what a disaster is fails to incorporate questions of social resilience – a necessary component of effective adaptation to climate change.

3.1 Vulnerability, Resilience, and Adaptation

Hazardscape, as a social-ecological metaphor, is not concerned with negative events in the abstract, but in the concrete material sense. This is studied through the lenses of how societies and individuals are vulnerable to hazard, and how this vulnerability is distributed, what aspects make societies resilient to potential shocks and what adaptive actions societies can take to mitigate risk. These are the same concerns that preoccupy the social science community with regards to climate change (Brown 2013). Literature abounds on the subject of vulnerability to climate change, adaptation to climate change and resilience to climatic changes (Pulwarty & Riebsame 1997; Thompson & Rayner 1998; Klinenberg 1999; Cutter, Mitchell, & Scott 2000; Christoplos 2001; Pelling 2001; Burton 2002; Pelling 2003; O'Brien & Leichenko 2008; Comfort 2005; O'Brien 2006; Fussel 2006; Adger 2006b; Dow 2006; Leichenko & O'Brien 2006; Smit & Wandel 2006; Cutter et al. 2008; Agrawal 2008; Schipper 2009; Ionescu 2009; Pelling 2011a; Sovacool 2011; Romero Lankao 2011; Mueller 2011; Tierney 2012; Sapountzaki 2012; Akter & Mallick 2013; Simon & Dooling 2014; Grineski et al. 2014). Before interrogating the idea of how climate change interacts with risk and resilience - particularly as an "amplifier" of environmental risk - it is necessary to propose working definitions of key terms, which will carry throughout the following chapters.

Vulnerability is the susceptibility to negative effects from environmental hazard, or the likelihood of experiencing harm when confronted with a hazardous event or circumstance. Vulnerability is composed of exposure, the likelihood that a given place will experience a given hazard, and within the social context exposure can also be different between social groups experiencing the same hazard. Thus vulnerability includes both a physical dimension, including physical risk and exposure, and the social factors which might cause a person, group of people, or group within society to experience harm (Adger 1999, 2006; Füssel 2007; Gaillard 2010; Gallopín 2006; Klinenberg 1999; Pulwarty & Riebsame, 1997; Tompkins et al., 2008; Wisner 1993).

In a climate change context, adaptation refers to actions that aim to respond to, or prevent harm as a result of, changing environmental systems.

> "Adaptation involves changes in social-ecological systems (for example, in entities that involve both human and natural components interacting in complex ways such as a coastal community or the agricultural industry of a region) in response to actual and expected impacts of climate change in the context of interacting non-climatic changes. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations. They also aim to meet more than climate change goals alone; and may or may not succeed in moderating harm or exploiting beneficial opportunities." (Ekstrom, Moser, & Torn, 2011, p. 11)

Not all adaptation is positive. Scholars have proposed the term maladaptation to describe adaptation interventions which, in the long run or the short run, (a) undermine resilience; (b) inhibit other, more effective forms of adaptation to environmental change; (c) solve one problem at the cost of causing other, new problems which increase vulnerability, decrease resilience, or inhibit future adaptation actions. (Barnett & O'Neill, 2010; Brown & Westaway, 2011b).

A critical social element of adaptive action is adaptive capacity. Conventionally defined as the ability to "cope" with adverse environmental changes, as well as the ability to learn and make changes to mitigate potential future harm (Adger 2006; Brown et al., 2011; IPCC 2007; Schneiderbauer, Pedoth, Zhang, & Zebisch, 2013a). Brown and Westaway (2011) note that adaptive capacity is a "latent" property of a system, which must be activated in order to achieve adaptive action. For the purposes of this chapter, adaptive capacity invokes Amartya Sen's (2000) work on capacity-building in development to note that capacity is a range of choices available at any given time. Therefore, adaptive capacity is the range of available choices, real or perceived, for changing in response to future hazards.

Resilience is the ability of a system to either withstand a potential hazardous event or influence, or recover its essential functions in the aftermath of a potential hazardous event or influence (Adger, Paavola, Huq, & Mace, 2006; Brown & Westaway, 2011a; Manyena 2006; Pelling & Manuel-Navarrete, 2011; Pendall, Foster, & Cowell, 2010). Resilience can only be measured in the context of (a) a given system, (b) a perturbation, and (c) a set of functions which are deemed "essential". How the system, perturbation, and essential functions are defined, then, becomes extremely important.

One significant debate in the context of climate adaptation and climate-related disasters is whether resilience should be measured in contrast to a previous state, or whether genuine resilience includes learning and adaptation in the post-crisis context. If resilience can be defined as returning to a pre-existing state ("bouncing back"), it automatically favors the status quo. If it must be defined on the basis of whether a system will be more resistant to negative shocks in the future ("bouncing forward"), assessing resilience demands an additional set of assessments of what constitutes "additional" or "adaptive" resilience (Meerow, Newell, & Stults, 2016).

Another major question is whether a system can be called resilient if it requires outside assistance or inputs to recover; Manyena (2006) and others (see Brown and Westaway 2011 for a literature review) argue that a system should only be seen as resilient if it can "self-organize" its recovery. The Additionally, resilience has to be measured in contrast to a pre-existing condition, including a pre-existing set of vulnerabilities or susceptibilities to harm. To some extent, any project which aims to understand the social impacts of an environmental change is going to be focused on at least one aspect of these - the area of focus depends on the type of intervention the project is aiming to make. Likewise, the choice of which aspect to focus on for analysis - vulnerability or resilience - determines whether analysis focuses on a community's weaknesses (vulnerabilities) or strengths (resilience).

3.2 Contesting resilience

Ideas of resilience are rooted in ecology and socio-ecological systems rather than in more anthropocentric approaches (Chapin III et al., 2004; Gallopín 2006; Manyena 2006). As many authors note, applying an ecological paradigm to questions of social resilience is usually done without an adequate adjustment for the differences between ecological and human systems (Adger 2000; Chapin III et al., 2004; Pendall et al., 2010). In particular, ecological thinking is rooted in an overall paradigm of scientific knowledge as independent of social systems and in pursuit of objective, universal truth. This totalizing epistemology often fails to represent or even to acknowledge issues of social difference and power, both within society and within the practice of science and the construction of scientific knowledge in and of itself (Collins 2008; Jasanoff 2005; Narayan 2004; Porter 1996; Turnbull 2000; Watson-Verran & Turnbull, 1995). In older ecological work, scholars defined resilience in contrast to a pre-existing steady state that was then subject to perturbations before returning to a steady state once more (Adger 2000; Folke et al., 2002; Füssel 2007; Pendall et al., 2010).

Over the last decade, the academic community has begun to recognize that the idea of a steady state lacks descriptive power, and instead to question how change is managed. One approach to this is adaptive management, described in Chapin et al as "management aimed building resilience... [that] focuses on slowly changing variables that create memory, legacy, diversity, and the capacity to innovate" (Chapin III et al., 2004, p. 345). Since the management failures which followed Hurricane Katrina in 2005, it became clear that top-level management was ineffective in disaster situations (Harrald 2006; Hartman & Squires, 2006; Picou & Marshall, 2007) and this, combined with increased attention to disasters from the climate change community, has led to a popularity of "flexible adaptation pathways" which incorporate adaptive management principles into climate change policy approaches (Rosenzweig & Solecki, 2014). However, "flexible" adaptation does not in and of itself address the social aspects of resilience and vulnerability, which are difficult to measure without attention to qualitative measurements.

To illustrate, take the example of vulnerability. It can be quantified through proxy measurements with available data such as poverty level, malnutrition, average educational achievements, access to public or private transportation, distance to a hospital, or availability of public resources. Susan Cutter, Christopher Emrich, Eric Tate, William Solecki, and others have cited an enormous array of proxy indicators which they then spatially superimpose on a given area (Cox et al., 2006;

Cutter & Emrich, 2006; Cutter et al., 2003; Prasad 2012; Tate et al., 2010; Yoon 2012). This is then cross-referenced and used to assess a "Social Vulnerability Index" which can be, in theory, used to target pre-hazard interventions to reduce vulnerability and/or build resilience.

Because vulnerability is pre-existing and centered upon whether or not a given unit (individuals, families, or communities; referred to in Sapountzaki (2012) as "exposure units") has access to physical and social resources such as money, shelter, clean water, job security, family members, and social services, a great deal of data is readily available to constitute proxy indicators for vulnerability, especially in wealthier nations with greater governmental monitoring capabilities.

However, characteristics such as resilience, because they are contingent on a hazardous event occurring and attempt to assess possible future outcomes rather than present hardships, are more difficult to measure using quantitative approaches. The same is true for adaptive capacity, the range of choices available to an individual or group who wish to increase their resilience or decrease their vulnerability through adaptive action. Vulnerability assessment through quantitative analysis provides a powerful description of the state of play, but does not have explanatory power without history and power analysis to provide causal explanations for the current distribution (or "social production") of vulnerability (Simon 2014a).

Nor is resilience a straightforward or totalizing concept, distributed equally throughout a population. To put this another way, assessing resilience requires first answering the following questions: a) Resilience for whom? Who or what is the thing that we want to be more resilient? b) Resilience to what? What is the hazard or circumstance that we want to build resilience to? c) Resilient when? What is the time frame in which this notion of resilience is measured? d) Resilient how? What system or systems are being targeted by resilience interventions? Resilience may be contingent upon the distribution of vulnerabilities and power, both in an relative sense (this distribution mediates the distribution of resilience) and in an absolute sense (an unequal distribution of vulnerability can lead to less resilience through the system as a whole - the collapse of the response system after Hurricane Katrina is an example of how this process plays out). Scholars of vulnerability and resilience tend to fall into thinking that vulnerability is the "flip side" of resilience (Folke et al., 2002; Gunderson 2000) and those who believe that resilience and vulnerability are independently functioning properties of a system that share some important common components, such as adaptive capacity. Sapountzaki falls in between these contingents, arguing that the activation of resilience in the face of hazard is a catalyst for redistribution of vulnerability in society (Sapountzaki 2012).

The implications for resilience as a catalyst for redistribution of vulnerability and power will be discussed at more length below. For now, it is important simply to recognize that resilience is a process *as well as* a property that describes a system at a given time. Because of this dynamic nature, it is challenging to describe in the abstract as well as to study specific cases of resilience.

If, for example, an investigator wanted to quantitatively measure a neighborhood's resilience to a tornado, she would have to do a longitudinal study in the immediate aftermath of the tornado, in a place where there was reliable data from the immediate pre-tornado period, and indicators would have to be measured repeatedly over a given timescale. This type of study is challenging,

because it is expensive and opportunistic. Nor are there agreements within the academic community about what indicators measure resilience, vulnerability, and adaptive capacity. The advantage of quantitative study is that it makes comparison across geographical and longitudinal scales possible - it can provide common comparative baselines and numbers which are putatively objective or, at the very least, legible to researchers seeking to identify larger commonalities, trends, and patterns. But the measurements are only as objective as the researchers making them - resilience and adaptive capacity are dynamic, socially contingent phenomena that have to be contextualized with qualitative analysis. Simultaneously, the challenge with resilience and adaptive capacity, particularly the latter, is that they are highly developed in the theoretical literature but not backed by empirical research. Empirical data sheds new light on these areas of inquiry, and in the long run will help to clarify and refine their definitions.

3.3   Adaptive capacity

One such example of empirical work is Akter and Mallick's (2013) paper which examines the relationships between poverty and vulnerability (commonly referred to as the poverty-vulnerability nexus) and poverty and resilience. Using empirical data collected through a household survey administered to a coastal district in Bangladesh that is highly susceptible to cyclones. 280 cross-sectional respondents were questioned about their household status before and a year after Cyclone Alia in 2009. As the conventional understanding of poverty and vulnerability would predict, the poorest households were the most vulnerable to cyclone damage. However, the poorest households were also some of the most resilient, measured by their ability to recover their household physical and economic security after the cyclone.

Akter and Mallick's work highlights the importance of definition; poverty and vulnerability are correlated under the narrowest interpretation of vulnerability, namely that vulnerability is exposure and susceptibility to harm. However, once elements of process - including social networks, access to relief, and sensitivity - entered the definition, the relationship became much less clear. Likewise, if resilience is interpreted as the ability to immediately bounce back after a negative impact, the poor are more resilient than the non-poor.

Outcome-based analysis show that poorer segments of society restored their households to a pre-cyclone state more quickly than groups in other income segments, and people in poorer groups pre-cyclone experienced higher proportional income growth post-cyclone. All groups were equally likely to build stronger houses during the rebuilding and repair processes. Aid went most quickly to those who had contacts with social elites and/or representatives of NGOs. However, there is no empirical evidence to suggest that the poor have less access to these groups than any other group, which weighs against a perceived anti-poor bias in the delivery of relief services. Additionally, the work finds that relief went most quickly to the very poor and the minority religious community.

Akter and Mallick's work illustrates many of the challenges with the sketchy definition of "resilience". Likewise, it highlights the strength of adaptive capacity as an analytical framework. Empirically, they prove that a community can be highly vulnerable and highly resilient at the same time, disproving the notion that resilience is the "opposite" of vulnerability. However, they

also note that there is an empirical distinction to be made between resilience and adaptive capacity, wherein households in their study could exhibit a high level of resilience in terms of economic and physical recovery, but low levels of adaptive capacity measured in terms of knowledge, learning, and heightened awareness of how to cope with future disasters.

Effectively, Akter and Mallick show that it is *not resilience, but adaptive capacity which is the notional opposite of vulnerability*, in that interventions which aim to increase adaptive capacity tend to simultaneously decrease vulnerability. Identifying adaptive capacity, like resilience, involves asking the questions "Adaptation for *whom*?" and "Adaptation to *what*?" Adaptive capacity is the ability to learn, change, and respond in an iterative manner that continually improves outcomes.

Adaptation can serve a variety of purposes, only some of which facilitate future adaptive actions. For example, building physical resilience to potential harm could include sea walls, which do not ameliorate the social factors of coastal risk and may put the coastal residents in a position where they are safer in the short term, but are dependent upon artificial beach replenishment in the long term. This type of action might even be considered "maladaptation". Building physical resilience might also include protection of mangrove forests which also support a range of ecologically positive interactions, such as increasing the abundance of local fisheries (Adger 1999; Aldrich 2012), and in so doing building the local capacity for future adaptive action.

As Ekstrom, Moser, and Torn (2011) point out, adaptation can include actions which may not directly target the effects of environmental change but help build resilience to risk nonetheless. Examples of this would be programs to increase the availability of high-quality, low-cost housing, efforts to reduce social inequality, or the provision of community health workers. All of these interventions are aimed at nominally "social" problems, but simultaneously increase community resilience to chronic and acute environmental hazards.

3.4 Positive and negative adaptation

Because vulnerability is such a popular idea, and is quickly becoming a major area of inquiry for social scientists, it is unlikely to suddenly fall out of favor with academics, planners, and decision-makers. However, as illustrated above and in Chapter 1, too narrow a focus on vulnerability can reinforce the discursive separation between nature and society, and between disasters and society. Moreover from the perspective of social justice and pro-poor advocates, a focus on vulnerability can connote a disempowering or patronizing emphasis on what a given community lacks, rather than the many physical and social assets which may also be present in a vulnerable community. Finally, the connection between negative events such as a cyclone with positive improvements in terms of livelihoods (e.g. greater long-term income recovery), external assistance and aid, and capacity-building initiatives begs the question of whether vulnerability is always a bad thing. To put this another way, if being vulnerable is a necessary precondition for positive adaptive actions, is it actually a good thing to eliminate all vulnerability?

Gallopín proposes the concept of "positive vulnerability", which challenges the commonly held notion that vulnerability is always something to be avoided. While he stops short of advocating

the intentional creation of vulnerability, he argues that to the extent that vulnerability leads to transformational change, and that change is positive, perhaps it shouldn't be viewed in an entirely negative light. This is supported by empirical research on droughts, where an awareness of vulnerability in and of itself leads to positive adaptation behaviors, which in turn increase resilience (Welsh, Endter-Wada, Downard, & Kettenring, 2013). Pendall, Foster, and Cowell (2010) invoke the concept of "lock-in" which describes institutional systems trapped at a sub-optimal level because there isn't enough momentum in favor of change to overcome the more conservative elements of the institution or system. A certain amount of disruption can lead to a shift in political or institutional power which can stimulate otherwise unachievable positive reforms.

Likewise, with so much effort being poured into increasingly complex models of predicted climate change impacts, it should also be noted that uncertainty can stimulate creative growth: "With diminished uncertainty comes diminished resilience as the system rigidifies and turns inflexible" (ibid., p. 77). This is not to argue that vulnerability should not be a matter of concern or a priority for research, nor does it mean that vulnerability isn't something that should be targeted by policy intervention. As many authors point out, the deeply unequal distribution of vulnerability is a moral concern in and of itself, but also has the functional effect of perpetuating other inequities, undermining regional resilience, and inhibiting economic growth (Adger et al., 2006; Brooks et al., 2005; Wisner et al., 2004).

I propose that an action is "adaptive" if it is undertaken to mitigate the potential negative effects of environmental change. Although adaptation has become extremely popular in policy and academic circles, it often too broadly defined, and there is still a dearth of empirical research directly addressing the effectiveness of different adaptation pathways (Moser 2009). Likewise, the social dimensions of resilience are under-specified in the literature, making it difficult to practitioners to target these aspects even if they wanted to (Brown & Westaway, 2011a). While there is a growing body of extremely recent work addressing that gap (notably the 2014 edited volume by Glavovic and Smith which explicitly aims to unite theoretical and practitioner perspectives), the SIRR report and popular conceptions of climate change adaptation reveal the persistence of a technocratic bias. Likewise, the popularity of vulnerability assessments and impacts-driven research, while valuable, retrenches this bias.

As Fussel and Klein (2006) point out, impacts driven research ignores the *why* of distribution, and the *how* of policy interventions - that is, it can describe the current state of affairs but it cannot explain how that state arose and what policy options are most reasonable for addressing imbalances of vulnerability and resilience. The first problem can be addressed by a hazardscape approach that views the production of hazard, vulnerability, and resilience over time (Simon 2014b). The second problem can only be addressed with the intellectual and political work which comes from weighing different adaptation options - the range of available adaptation options is the community or individual's capacity to adapt (Glavovic & Smith, 2014b). My empirical research in New York City indicates that this intellectual and political work is not being done. Instead, initiatives for climate adaptation are falling into familiar patterns of technological reductionism and trying to solve social problems with engineering approaches. By failing to

address the social factors, New York City's approach to climate change threatens to retrench the social divisions which undermine disaster resilience in the long term.

My findings are echoed in ample recent literature. Empirical analyses of climate change adaptation and resilience demonstrate that social and cultural factors, so poorly addressed by biophysical framings of adaptation, are extremely important for building resilient systems. In an empirical study of resilience in Angola, Bujones et al (2013) analyzed resilience in five systems - political, security, economic, social, and environmental - and in the context of institutions, resources (physical assets) and what they referred to as "adaptive facilitators", cultural and social non-material aspects of resilience. Their findings were that the economic, social, and environmental systems were much less resilient to shock and disruption. Additionally, the most important resilience factors they found were the cultural and social "adaptive facilitators."

Cutter et al (2008) refer to the social elements of vulnerability in their Disaster Resilience of Place (DROP) model as "community competence" and develop proxy indicators for it accordingly. Proxy indicators are also developed for Alpine regions by Schneiderbauer et al (2013b) and described by Smit and Wandel (2006). A process-based definition of resilience (Gallopín 2006; Manyena 2006; O'Brien 2012; Sapountzaki 2012) must include not only the ability to recover from a harmful event and restore the pre-event state of affairs, but also the ability to learn from the negative experience and modify behaviors accordingly.

Smit and Wandel (2006) and Adger (2006) use the terms "adaptive capacity" and "response" interchangeably, and Cutter et al (2008) conflate the terms "adaptation" and "adaptive capacity. But Akter and Mallick (2013) highlight that a response to disaster may appear highly resilient - even <u>be</u> classified as resilience along many definitions - without including the learning and capacity-building which leads to more effective <u>future</u> responses to hazards. But as Manyena (2006) points out, how can we measure a concept which presupposes a hypothetical future outcome?

Rather than measuring resilience, I propose that academics and policymakers focus their attention on adaptive capacity. Adaptive capacity is the range of adaptation options available to a community or individual at a given time. Adaptive capacity can be further subdivided into two subtypes. *Real* adaptive capacity is the absolute set of choices available for adaptation actions at any given time. *Perceived* adaptive capacity is the set of choices for adaptation action modulated by political reality, social norms, and the availability of knowledge.

3.5   The social production of vulnerability

Part of any push towards transformative adaptation will require a new recognition that vulnerability is rooted in socio-environmental factors, particularly patterns of hierarchical dualism and the social production of inequality. Environmental vulnerability is partly the product of, and a reinforcement of, social inequality, and historical injustices compound to create long-term social processes of vulnerability production. In the following section, I will illustrate how

this process operates, first with case studies from the literature and then from an analogous case from my own research.

3.5.1 Historical analogues: patterns of marginalization and facilitation

To provide an overall policy context, it is valuable to keep in mind the way that public authorities can create environmental amenities which are enforced or funded by the public yet at the same time act to serve the interests of private wealth. For Jeff Romm (2001), the creation of the national forest reservations, while a triumph of the conservation movement, also dramatically increased the value of land immediately adjacent to the national forests, as well as the comparative value of privately held timberlands.

These patterns play out in urban as well as non-urban landscapes. Describing the way mortality during the 1995 Chicago heat wave followed lines of race, class, age, and location, Eric Klinenberg invoked the "entrenched logic of social and spatial division that governs the metropolis" (1999, p. 240). Yet these entrenched logics follow anywhere that humans settle, with vulnerability to natural hazard following set patterns of social difference, regulated by spatial organization that protects some at the expense of others. What is helpful about studying urban areas is that the differential attitude towards risk and vulnerability is made more clear when populations are densely situated in close proximity to one another.

For example, in Los Angeles Mike Davis famously contrasts the way that fire hazard is dealt with in Malibu Canyon and Downtown Los Angeles, two different areas of the same city. Malibu is an extremely privileged enclave of large, hillside houses overlooking the Pacific Ocean and Mediterranean-style canyon vistas. In Downtown, housing is predominantly apartment blocks and it is one of the few neighborhoods with a high concentration of traditional tenement buildings and inexpensive single-room occupancy housing. Both areas are prone to fire, but for very different reasons.

In the tenements and apartments, the city's failure to properly enforce housing safety codes, and a lackadaisical culture with regard to flouting those norms on the part of landlords, leads to a stock of housing which is prone to catch fire due to bad wiring, faulty appliances, substandard materials, and inadequate fire exits. Because these buildings are densely populated in a city with a shortage of affordable housing, even relatively small fires have significant rates of mortality and injury. The cause of these fires is profoundly social and entirely preventable.

In Malibu, however, the houses of the rich and famous are built in a sage-scrub environment which has historically been prone to fire. These fires are both naturally occurring, through the combination of lightning and dry fuel, and human-caused. Before Spanish settlement of California, coastal tribes such as the Tong-va in the Los Angeles basin routinely used fire as a form of ecological control, as it encouraged more diverse oak woodland and discouraged fast growing softwoods such as pine. Frequent smaller controlled burns also reduced the severity of the larger fires in extremely dry years, and local native tribes tended to settle in the sheltered areas between the coastal and canyon lands.

Because of the terrain, any fire which occurs in the coastal canyons is easily fueled by the coastal onshore and offshore flows which are concentrated through the canyons from breezes into high velocity winds. For the wealthy residents who have chosen to build or buy homes in Malibu, the common windstorms are an amenity which help to cool temperatures in the summer and blow away the ever-present air pollution.

In Malibu, fire is not the product of careless landlords, inadequate housing stock, and a lack of building inspectors. In Malibu, the fires are a direct result of natural processes that were routine long before Los Angeles was a backwater on the El Camino Real. Yet like the fires in Downtown, they are also preventable. The county could refuse to allow any further building in Malibu Canyon and buy out the existing homes, or failing that they could rigorously enforce planning restrictions that force houses to have fire-resistant roofs and walls, large areas of setback free of vegetation, and other stringent planning restrictions to mitigate risk. Where weak versions of these regulations exist they are, like the fire code in tenement housing, not enforced.

Yet as Davis points out, a fire in Malibu is socially constructed as an entirely different phenomenon from a fire in Downtown Los Angeles. Where the former is a disaster demanding millions of dollars in firefighting efforts, insurance payouts, federal grants, and private nonprofit relief, the tenement fires are framed as tragic, but quotidian, occurrences. Fires are something that simply happen to the poor of Downtown LA, an inevitable product of their poverty. Concealed within this framing is the discursive assumption that the poor are people that bad things happen to (and, implicitly, that is a relatively insignificant fact of life) whereas the rich are people who must be protected from harm using all the resources of the state.

As Davis describes, firefighting tactics are dictated not by strategy, but by house prices. Likewise, the County Fire Department's efforts to use controlled burning to reduce overall fire risk are vehemently resisted by well-moneyed, well-connected residents who believe that the aesthetic harm of controlled burning will depress house prices. However, local homeowners also resist calls to share the cost of upgrading the roads, water mains, and other aging yet critical firefighting infrastructure. These patterns are only complicated by the many indications that show climate change in California giving rise to more common, and more severe fire seasons in areas which are already naturally prone to burn. As Davis puts it,

> "The $100 million cost of mobilizing 15,000 firefighters during Halloween week 1993 may be an increasingly common entry in the public ledger. Needless to say, these is no comparable investment in the fire, toxic, or earthquake safety of inner-city communities. Instead, as in so many things, we tolerate two systems of hazard prevention, separate and unequal" (1998, p. 147).

Timothy W. Collins describes a similarly unequal system of hazard management in the White Mountains in Arizona. Where the White Mountains were traditionally a sparsely populated rural landscape inhabited by people involved in extraction based livelihoods (particularly timber harvesting and sheep farming), growing numbers of urban residents are buying second homes in the picturesque, mountainous region. Yet like the edges of Los Angeles, this is a landscape with significant fire hazard - and an area where the exposure to natural hazard is differentially distributed. Collins distinguishes between the "middle class economy" residents who are there

year round and depend on local industry and the "amenity economy" with predominantly part-time residents who are seeking an aesthetically pleasing residential landscape.

To characterize the ways in which the hazard vulnerabilities of the middle class residents are under-served by local decision-makers, and the ways in which the amenity economy is politically dominant in social response to vulnerability, Collins invokes the concept of marginalization, commonly used in critical geography and political ecology analysis of disaster vulnerability. Tracing back to early political ecological work on soil degradation (Blaikie 1985b) and a Marxist-infused political economic approach to studying social-environmental problems, this use of marginalization "connotes how social inequalities limit the livelihood options of these groups, leading them to degrade landscapes and occupy hazardous environments, constraining their abilities to cope with environmental changes" (Collins 2008, p. 21). However, Collins also invokes the opposite of marginalization, in which certain groups have their social options expanded through inequality. Collins labels this correspondent process, by which inequality removes constraints upon the privileged classes, facilitation.

Collins characterizes the amenity seekers of the White Mountains as being driven by the larger discourse of environmentalism which has flourished in the United States after World War II, where rural and forested landscapes which were once seen as sites of extraction and resource utilization are now seen as romantic landscapes for people to enjoy through non-extractive outdoor activities such as camping, hiking, biking, and kayaking. Yet this "environmental values" orientation does not include an affinity for prescribed burning or other, non-aesthetically pleasing strategies for managing fire risk.

The exposure to hazard has increased both in terms of numbers and property value in fire-prone regions. Collins describes the construction of a "mountain playground" economy where residents who once worked in extractive industries now work in tourism and service jobs. This socio-political landscape of changing industrial uses coupled with a growing amenity economy is the production of increasing number of affluent urbanites, real estate interests taking advantage of this growing affluence, and local decision-makers who seek to serve the former two groups.

The efforts to mitigate hazard in the White Mountains are centered on a laissez-faire model of self-protection, with the primary areas of responsibility falling on home-owners. Consequently, those who have fewer options for self-protection, such as those who rent their homes or are already socioeconomically vulnerable, are made more vulnerable. Because of a dominant pro-growth, anti-regulatory ideology in the region, restrictive planning regulations that could reduce risk exposure are eschewed, as are taxpayer-funded infrastructure designed to combat hazard risk. Thus, collective solutions that would be available to all local residents regardless of socioeconomic status are not pursued, reducing the overall expenditure required to live in this vulnerable landscape, which in turn encourages greater numbers of amenity-seeing residents.

A similar pattern of marginalization and facilitation emerges in Gregory Simon's account of the Tunnel Fire in Oakland, a catastrophic wildfire that swept through an urban-wildland interface neighborhood in 1991. Like Collins' account, and Akter and Mallick's work, Simon's paper looks at the ways in which social inequality produces vulnerability in patterns that run counter to

pre-existing assumptions about risk and social class. Like the amenity seekers in the White Mountains, most victims of the Tunnel Fire were wealthy and privileged, occupying homes where the risk of harm was outweighed by the desirability of the landscape. Tunnel fire victims, like those who occupied the wealthy but devastated are of Breezy Point in the Rockaway Peninsula, were much more able than many others to recover from the disaster. Yet the increased risk of fire in this area was the product of historical and political choices in which *social* factors, as opposed to physical ones, created a vulnerable landscape.

Simon relies heavily on what he characterizes as "spatial-historical analysis" to trace the processes which combined to enable the fire's devastation, processes which could have, through different social choices, led to a very different distribution of fire risk. Like hazardscape, this historical approach relies on a geographical analysis of how hazards, vulnerabilities, and capacities are distributed, and combines that with long-term historical patterns of socio-environmental development. Viewing the history of Oakland's ecology and development through a political ecology lens, Simon is highly critical of the ways in which political power, material affluence, and legal fiat combined to produce increased vulnerability to natural hazard.

The Tunnel Fire occurred in Oakland's hills, along the eastern edge of the city. In the latter half of the 1800s, this area was richly forested with redwood and other desirable species, and was logged to fuel post-Gold Rush housing boom. At the turn of the century, property developers seeking to attract wealthy homeowners from San Francisco and the peninsula realized that while the Oakland and Berkeley hills had attractive vistas across the bay, the deforested landscape was unappealing in and of itself. Two fast-growing species, eucalyptus and pine, were favored by developers - over 3 million eucalyptus and monterey pine seedlings were planted by a single property owner between 1910 and 1913.

The combination of afforestation and views towards the Golden Gate led to new, wealthy enclaves and a great deal of profit for the developers, remaining popular with homeowners until the present day. Decades after the housing boom in the hills, popular opinion in California, particularly among homeowners in suburban areas like the Oakland Hills, began to turn against taxation. This sentiment eventually led to the 1978 passing of California's Proposition 13, which dramatically restricted the amount of property tax which local authorities could assess, and also restricted the amount it could be raised from year to year. (As Simon points out, there were streak differences in prop 13 voting patterns between neighborhoods, separated by lines of socioeconomic class and population density.)

With the passing of Prop 13, local governments rapidly lost the funding which they had previously relied on to maintain infrastructure and services, including emergency services. In Oakland, the dramatic cuts to public funding spurred a desire to increase the property tax base through increased development in the highly-priced hills. However, this additional development would only products net revenue increases for the city if it was not accompanied by additional spending on services. Thus, Prop 13 encouraged the Oakland city government to allow new housing developments in the fire-prone hills, without increasing the number of fire stations or emergency service capacity. Likewise, the species that had been chosen for dense afforestation half a century earlier, eucalyptus and pine, were softwoods which burned easily and at high

temperatures. Finally, the decrease in emergency services funding led to an increased reliance on emergency response capacity throughout the region, which can be pooled in a crisis and sent from a variety of different jurisdictions to the area in question.

At the same time, the overall capacity of the Oakland Fire Department was decreased in the 1970s and 1980s, with reductions in the number of personnel and stations. Unfortunately, this increased dependence on shared services did not come with a corresponding investment in standardization of equipment, and thus different jurisdictions relied on different communications equipment, different hierarchies of command, and in many cases even different diameters for hydrants and hoses. As a result of these conjoined factors, when a fire began near the Caldecott Tunnel in the Berkeley highlands, it quickly spread to recently-built, densely populated condominiums, and, fueled by dry brush, softwood trees, and strong winds, it expanded into the narrow roads of the Oakland hills. In the course of a single day, the conflagration grew to the point that it was generating its own winds, and over the three days before it was fully contained the disaster destroyed over 3,000 homes, killing 25 people, and injuring at least 150 (Routley 1991).

3.5.2 The "periphery of the profoundly disturbed"

In New York City after Hurricane Sandy, hardship was similarly, albeit less dramatically, divided along social lines. The immediate crisis - the storm and its effects - affected residents regardless of status. Places with concentrations of high wealth, such as Lower Manhattan and parts of Brooklyn, lost power and water pressure along with the lower-income and middle-class communities in Bayside, Staten Island, the Rockaways, and Howard Beach. One of the most catastrophically stricken areas was Breezy Point on the Rockaways peninsula, a barrier island between Jamaica Bay and the Long Island Sound. This area was predominantly occupied by well-paid, unionized blue-collar workers. The neighborhood is actually a private cooperative, collectively sharing the costs of some local services, and also maintaining an exclusive atmosphere. As of the 2013 American Communities Survey, Breezy Point was 98.9% white, compared to nearby Far Rockaway's 36.7%, and 42.3% for the borough of Queens.

Many of the residents worked for the local emergency services so were already on the job trying to protect other neighborhoods as their own flooded. At some point during the flooding, saltwater came into contact with electrical wiring and began a fire, which spread despite the rain. It would eventually 130 houses and damage 50 others - about 5% of the neighborhood's total housing stock. Although the entire Rockaway peninsula was severely affected by Hurricane Sandy, only Breezy Point experienced significant damage due to fire.

However, the recovery in Breezy Point contrasts with the recovery in the Rockaways as a whole, particularly with the nearby communities of Far Rockaway and Rockaway Beach. In interviews, respondents from Rockaway Beach were particularly frustrated by the perceived gaps between disaster aid getting to Breezy Point and aid to other neighborhoods which were less privileged economically.

As one of our interviewees, a male pastor in his 40s from the Arverne neighborhood in Rockaway Beach, put it:

> "For us here in the Arverne area when we go down to FEMA we go through there are a whole different drawn out plan. And having friends in Breezy Point and having acquaintances in Breezy Point heard they didn't have to do half of the things to be assisted by FEMA. So you can see even from the federal perspective they made the choice. So it's not a local or it's not an individual thing you can see it was they had made the decision well we are do such-and-such for the rich and keep the rich rich, and then whoever pick up on the bottom that where they're left."[5]

Just as Akter and Mallick (2013) found that in the aftermath of cyclones in Bangladesh relief went to the richest and poorest, leaving those in the middle of the economic spectrum to fend for themselves, observational work and interviews in New York City after Sandy revealed the exact same pattern.

As a volunteer who had been working on mold remediation in the Rockaways put it,

> "We've felt like there's a lot of families who are having a really fucking hard time and who are really like happy to see anybody show up. I also think that, I think that help with, I mean, obviously Breezy got a lot of assistance because of being fireman, because of being cops, because of being civil servants and there being a network, I mean, I think 1,000 people came in from Ireland to help, you know, because it's so heavily Irish and then Bell Harbor, same thing. And they have the whole disaster relief operation staged out of there with like Team Rubicon and the Mormons and everybody was centered there and then you started having people particularly more grass roots people and then other people kind of focused more on Far Rockaway but then you really had Edgemere and Arverne, which are in the middle of all the – were not really on people's radar, you know."[6]

Very few of our interviewees and informants had anything positive to say about the Red Cross, whose most notable achievement in its post-Sandy relief efforts was being so irresponsible and ineffective that it was the subject of a major series of expose articles by the investigative journalist network *Propublica*[7]. However, the poorest residents, particularly those who lived in public housing, did see the Red Cross in action, with one interviewee saying "the Red Cross was a big help. They- certain people wouldn't be living in their crib right now. No living room, no couch no nothing."[8]

The majority of our interviewees, however, had very negative responses when asked about aid from organizations such as FEMA, the Red Cross, and the Salvation Army, as opposed to friends, family, neighbors, or local organizations.

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5 Interviewee #1. For a complete list of interviewees, see appendix. Interviewees are quoted here but who wished to remain anonymous were randomly assigned numbers to identify them in the text.

[6] Interviewee #11

[7] The compliation of articles – which continued, after Sandy, with investigations into the Red Cross's work in Haiti and Louisiana, see https://www.propublica.org/series/red-cross

[8] Interview #7

An affected resident from Coxsackie, New York, noted:

> "As far as help from Red Cross, that was two weeks until they came. And they weren't really walking around directly after, about 3 and a half weeks the church, of the local churches, FEMA and other local businesses, they set up shop, if you will, for aid for people in the area, at the various churches in the area: So St. Jude, there's Holy Cross on Flatlands, they set up some stations, and then people would be able to go to get supplies, but as far as people coming out and giving supplies, that didn't happen until way, three weeks into it, and then it was even the government FEMA that was doing it, it was just really local churches.
> Q: Really, voluntary?
> A: Yeah, voluntary. It wasn't any -- it wasn't local government at all.[9]

Her comments were echoed by another resident from Staten Island:

> "We saw Red Cross traveling weeks after Sandy hit, and they were walking around trying to console people who didn't live here anymore, nobody lived here. They didn't understand that, they were three weeks late. They were handing out cleaning buckets and things that, the brooms had been screwed together, it was just like a waste of money, so here's all this money that's out there but just not getting to the right, to all the people.[10]

Pre-existing inequalities were compounded by the failure of infrastructure subsequent to the storm, which created dramatic differences between those who had access to amenities like private transportation and nearby family members (Bergren et al., 2013).

For the first eight weeks after the storm, there were only overcrowded buses and taxis. At Thanksgiving, the city began running limited service on one small portion of repaired track, the stopgap "H" line. But the comfortable ten minute trip across Jamaica Bay was still a grueling and unreliable slog, albeit a less expensive one. Bus service from Howard Beach station, which slowly groaned through traffic all along the perimeter of John F. Kennedy airport, one of the busiest air travel hubs in the world. After 45 minutes to an hour, Rockaway residents were deposited at another station at the end of the H line, which ran less often than the normal subway, had limited hours, and ran painfully slowly over the storm-damaged track. Residents who depended on the subway to get to work and school had to move for those seven months, often cramming into already overcrowded apartments elsewhere in the city. Their neighbors in Breezy Point, almost all of whom had cars, found themselves driving through much quieter streets.

The experience of pastor of a church in Coney Island, Edward Malave, was representative of the vast majority of informants and interviewees that Superstorm Research Lab participants worked with:

> "I just moved back into my apartment two days ago. [January 2013]. And that's the only apartment that has heat…There's a lot of people here right on 20th Street where we are at that still have no power. They have no power, no heat, no nothing and they are living inside the apartments in those conditions."

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[9] Interviewee #3
[10] Interviewee #5

When I was walking around Rockaway Beach and Arverne at the same time, early January, the only buildings with mains electricity were in the new development of Arverne-by-the-Sea. Ten weeks after the storm, houses that were occupied ran off generators, as did the local police and fire stations.

The storm had not only cut power (and by extension, water, in high-rise buildings such as the many public housing projects in Far Rockaway), it had also destroyed the "A" train subway connection between Manhattan and the Peninsula. Until the following Memorial Day weekend - seven months after Sandy - this critical connection to the rest of New York City was lost.

The narratives of Superstorm Research Lab respondents, the "doughnut hole" shaped gap in the availability of relief, the children who spent weeks or months bussing to schools in different boroughs as their own campuses were repaired – these peope are members of the group referred to by the essayist Rebecca Solnit as "the periphery of the profoundly displaced" (Solnit 2010), a group of people who have been devastated by disaster but not in a way which is easily dramatized (death or other profound physical harm) or quantified (i.e. people whose financial losses are either comparatively small or difficult to assess.

Patterns of continued vulnerability and insecurity in the aftermath of a disaster are not inevitable, but the result of choices: how much money is allocated to storm-proof a school? Should traffic be re-routed to accommodate bus relief while the subway is being repaired? Should aid money be given to churches who act as distribution centers?

> "Here we have a house of worship, I don't know if I told you this before, but FEMA does not want to provide any funding or any help to us because we are a house of worship, which is wrong absolutely wrong…So some representatives from FEMA just came over and they themselves, you know just before you he's shaking my hand and he say God bless you. He's saying you do such a good job and I'm so sorry to tell you but you're going to have to go back and reapply and say that you are something else other than a church. I said I can't do that." (Edward Malave, Coney Island)

These examples all show how vulnerability is produced socially, rather than being an outcome of physical proximity to hazard. It is historical, it manifests on the level of discourse and policy, and it is mitigated or multiplied by one's position within the spectrum of social difference. It is particularly useful to think about the social production of vulnerability within the context of hazardscape - this phenomenon provides an illustration of how a more holistic approach to disaster, encompassing historical, social, and political factors, might have more explanatory power than a conceptual framework which fails to address social issues. Furthermore, it shows how a failure to address social processes, and the connection between social processes and disaster outcomes, produces flawed policy. A more extended look at flawed policy approaches to hazard management is discussed in the following chapter.

4 Adaptation gaps in Policy and Practice

4.1 Freeways and other struggles

"Highway planners, like others charged with the responsibilities of planning and managing cities, targeted not people of color but the spaces in which they lived." (Avila 2014, p. 43)

The recovery from Hurricane Sandy occurs not in a vacuum but in an overall historical context of dispossession through redevelopment. The crisis prompted the city to embark upon a new, ambitious program of climate adaptation strategies, many of which will entail the reconstruction and reconfiguration of major elements of the cityscape. Although these initiatives are responding to a newly recognized threat (the negative effects of climatic change) they fit within an overall pattern of ambitious and sweeping urban development and redevelopment which has characterized the evolution of New York into a major global megacity. While many of these initiatives - such as urban renewal, the gridded street system, or the Interstate freeway system - were planned and enacted with noble intentions of building a more efficient, more livable, and more pleasant city to live in, they come at a cost which is paid both financially and socially. Particularly in terms of negative social impacts, those costs are unevenly distributed throughout the city's class and ethnic strata.

Because climate change is a new type of socio-environmental problem, both policy-makers and scholars tend to think about solutions to climate change as a new and specific set of policy approaches. While the scope of the solutions may be new – the sweeping scale of initiatives and processes that must work together as a suite to address a planetary crisis – the actual day to day implementation of these solutions is going to be remarkably similar to other large-scale public initiatives. This is particularly true in the context of most of the proposals in response to Hurricane Sandy addressing physical, rather than social factors. Dune restoration is the same process whether it is classified as climate change adaptation or not, the reconstruction of mussel beds around Manhattan is the same whether it is done to absorb storm surge or revitalize a fishery[11].

The scale of the public infrastructure projects proposed by New York City and other municipalities responding to potential climate threats is reminiscent of the post-war technological optimism of the 1940s, 1950s and 1960s. Given this, it may be useful to reflect back on one of that era's most profound and sweeping public infrastructure initiatives: the interstate highway system. As described in Eric Avlia's recent monograph on resistance to the project, *Folklore of the Freeway* (2014), the new highways were closely linked to efforts in the United States (and in Europe) to redevelop cities under the banner of "urban renewal" and "slum clearance", programs which may have been well-intentioned but often ended up displacing the poor for the benefit of wealthier urban residents and local business interests. As I discuss below, an analogous process continues today in the form of gentrification.

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[11] Though, as Michel Callon points out (1986) in a well-known study of St. Brieuc in France, it is important to recognize that bivalves are not always cooperative partners in human endeavors.

The interstate freeway system, the last great national infrastructure project, inflicted "deep fissures...literally, by cleaving the urban built environment into isolated parcels of race and class, and figuratively, by sparking civi wars over the freeway's threat to specific neighborhoods and communities" (Avila 2014, p. 9). Intimately linked to initiatives for "urban renewal", the freeways were built in urban areas which were already characterized as blighted – the idea was to use the same money to build the freeway and clear the blighted area. However, as Avila notes, the first criterion for the Home Ownership Lending Corporation in measuring blight was the percentage of "Negros" (ibid., p. 45)

Invocations of past experiences formed the freeway resistance in ways that were both metaphorical - building a sense of collective experience and solidarity in which organizing could take place - and literal. The freeway building coincided with a new national attention to historical preservation, and new laws designed to protect the physical reminders of history were an opportunity to block construction. Struggles against the freeway were informed by "an insurgent sensitivity to a community's history" yet at the same time "in the face of the freeway, a community clung to its past to preserve its cohesion, but during the interstate era, this strategy only worked in those communities built by Europeans and their American descendants" (2014, p. 90).

The story of the freeway revolt, and likewise freeway extension, is racialized, with the most effective resistance occurring in wealthy white-dominated areas such as Cambridge, Massachusetts, Beverly Hills, California, and Princeton, New Jersey. While the resistance itself may have included many affected residents of every hue, background, and locality, the places where the revolt succeeded tells a story of race, class, and power. In some cases, the racial politics of freeway construction were less subtle, with local city planners deliberately targeting neighborhoods dominated by nonwhite ethnic groups; a major facet of this targeting was employing the same language of urban blight which was so significant in the slum clearance struggle in New York City.

Avila compares the work of the highway builders to the work of the Quarantine Authority, patrolling the streets of the *barrio* with helicopters allegedly searching for rabid dogs. The siting of the freeway projects in Los Angeles formed an enclosure around the neighborhoods in which brown bodies lived, "to sequester radicalized bodies within the fortified presence of a community bounded by highways" (2014, p. 83).

In New Orleans, there was a contrast between the battles fought between white residents of the Vieux Carre (old town and French Quarter) and the black residents of Faubourg Treme, an equally historical district and the oldest community of free blacks in the United States. While the Vieux Carre property owners successfully stopped construction of the Riverfront Expressway, the elevated Interstate 10 replaced the live oaks which grew on North Claiborne Avenue in Treme.

In Lower Manhattan, the fight against LOMEX, the Lower Manhattan Expressway, was framed as "The Fight for [the historic district of] Little Italy" in the mid-1960s. Although LOMEX wasn't built, in 2015 Little Italy is no longer an ethnically Italian, working-class neighborhood welcoming new immigrants in search of economic opportunity. Instead, the few

delis and pasticcerias that remain share their blocks with wealthy young urbanites, cocktail bars, boutiques with fedora logos, and doggie daycare. Little Italy fell prey not to the freeway, but to gentrification. The cupcake bakery, at least, is owned by an Italian-American family.

However, Avila does point to two historically nonwhite neighborhoods (Rondo in St. Paul Minnestota and Overtown in Miami, Florida) which have deliberately sought to emphasize their historical character despite a freeway being constructed in their midst. In Rondo, the freeway actually increased the concentration of black residents in what had previously been a racially diverse area. Of the families displaced by the freeway, 90% of the white residents relocated to other neighborhoods, whereas only 15% of the black residents did. The concerns of the residents who wished to stay in Rondo - among them fear of discrimination in other neighborhoods - were borne out in the experiences of the families who relocated (2014, p. 103). However, the experience of destruction, and preserving the memory of Rondo in the pre-freeway days, became a rallying point for the neighborhood, and the genesis of the Rondo Days Festival which has celebrated the community and its history since 1982.

Resistance to the freeways was not the same as fighting poverty. Indeed, many white organizers of anti-freeway efforts, such as Jane Jacobs, sidestepped or ignored the links between highly racialized urban poverty and the "quality of life" narrative that characterized (and deracialized) freeway struggles in many cities. By attacking the symptom of urban marginalization rather than the marginalization itself, the predominantly white anti-freeway activists left the power structure in place that had marginalized their neighborhoods in the first place.

A similar de-racialization of the political conversation over how and where adaptation money should be spent emerged in the wake of Hurricane Sandy. Despite the best efforts of coalitions such as ALIGN-NY and Zone A, the connection between social resilience, racial marginalization, and storm-related dispossession was under-recognized by both the city and the media (Bergren et al., 2013; Cowan 2014; Wagner et al., 2014). Unless these connections are recognized, adaptation will continue to fail to address the issues of social inequality that create and perpetuate vulnerability to environmental hazards.

Despite the cautionary tales, large-scale adaptation infrastructure will be necessary. The most immediate needs will probably be in coastal and riverine areas, which will be at increasing risk from coastal storms and intense precipitation events. Shifting the orientation of these projects away from catering to the interests of the most powerful, and towards the needs of communities with less political and economic power, will require a deliberate re-orientation towards the intersection of adaptation initiatives and economic justice.

The following section describes a conceptual framework which can be applied to climate adaptation policy to make it more economically and politically equitable.

4.2 The Adaptation Gap

In the arena of climate change mitigation, social justice scholars have developed the concept of a "climate gap" to describe how both climate change (as a phenomenon) and climate change

mitigation actions tend to further negatively affect those who are already at a social disadvantage. In a review of the literature on differential effects of climate change in California, it was clear that many of the most probable negative health consequences of climate change, particularly the increase of extreme heat events, fell most heavily upon those with lower socioeconomic status (and therefore greater overall health vulnerability in general) in the first place (Shonkoff, Morello-Frosch, Pastor, & Sadd, 2011). As Klinenberg (1999) points out, the distribution of vulnerability in heat mortality events follows economic, socio-temporal, and physiological factors, heavily mediated by whether groups have access to both immediate relief (in the form of emergency services) and political power (through the capacity to advocate for more effective services and support).

In addition to the lack of fiscal resources to cope with increased environmental stress, in heat events and other environmental disasters people with pre-existing health conditions, or disabilities, are most likely to die or become extremely ill. The presence of health risk factors, such as asthma, cardiovascular disease, and diabetes is much more common among the already disadvantaged, in part because they have less access to the health system and in part because those communities are disproportionately likely to bear the risk of environmentally harmful development.

Likewise, the cost-sharing of burdens for both mitigation and adaptation tends to be regressive, particularly in the United States when these burdens are commonly shared out under an already-regressive tax policy. Similarly, when carbon taxes or fees are assessed on fuel oil or gasoline, there are no adjustments made for the poor, who are both more likely to use those fuels (due to sprawling urban development and the upfront costs associated with weather-proofing housing stock) and more likely to have those fuel costs be a major part of their monthly budget.

Another set of problems arises through the mechanisms of implementation for emissions reduction. One of the major problems of cap and trade regimes is that they often fail to account for the ways in which environmental burdens are already borne by disadvantaged communities and people of lower socioeconomic status. The advantage of cap and trade is flexibility, theoretically allowing the market to distribute the costs of emissions reduction in the way that is most efficient. Yet as described above, the "lower costs" associated with polluting poorer communities are the result of hundreds of years of policies which marginalize nonwhite ethnic groups and the poor.

Therefore, although the poorest communities are more likely to cohabit with environmental risks, they are still the cheapest places to put polluting industrial zones. In a cap and trade system, this is the most economically efficient distribution of risks; it is also the most morally unjust.

However, as demonstrated by assessments of AB32 in California, the reduction of greenhouse gas emissions tends to be accompanied by co-benefits through the overall reduction of harmful aerosol pollutants. For example, diesel-associated particulate emissions, nitrogen oxides, and carcinogens such as benzene, formaldehyde, and toluene are all associated with the reduction of emissions from power plants and transportation (Ebi, Mills, Smith, & Grambsch, 2006;

Morello-Frosch & Lopez, 2006; Morello-Frosch, Pastor, Sadd, & Shonkoff, 2009; Shonkoff et al., 2011). The importance of environmental health co-benefits highlights the way that climate change is part of an interlocking system of environmental stressors which disproportionately affect the poor.

One way of thinking about this process is the "double exposure" concept proposed by Robin Leichenko and Karen O'Brien (2008). They argue that socio-environmental hazard is being redistributed not just by climate change, but by economic globalization as well – just as the process of economic globalization is one of the driving forces behind climate change. Thinking about either one of these processes by itself – climate change or globalization – fails to accurately represent the way that they work in tandem to drive inequality and hazard both within and between nation-states.

This idea has been extended by scholars such as Gaillard (2012), who looks specifically at small island states and international distribution of hazard, and Grineski et al (2014) who argue that there is actually a "triple exposure" combining globalization, climate change, and demographic vulnerability. What this work highlights is that the negative effects of climate change are just one of many stressors working in tandem, disproportionately affecting the poor and marginalized. Climate change is, in effect, an amplifier of pre-existing risk, rather than a hazard which can be addressed in isolation.

This pattern is very present in an analysis of recovery from Hurricane Sandy (Bergren et al., 2013). Participants from the cross-disciplinary Superstorm Research Lab found that the storm had significantly different impacts on different social classes, as opposed to the popular media presentation of the event as a single discrete event from which the city as a whole was healing from. For many of our respondents who had already been marginalized either culturally or socioeconomically, the storm was incorporated into a much longer pattern of shock and recovery cycles which occurred and recurred over long periods of time.

Our interviews with volunteer first responders also reflected the awareness that the effects of the storm compounded pre-existing hazard, such as health inequalities. As Nate Kleinman and Dylana Dillon, two Occupy Sandy volunteers in New Jersey, put it:

> Interviewer: Can you expand on what some of these system issues that you mentioned are, that have going on?
> Dylana: [sigh] Oh. Yeah. Well, unemployment--huge one, people not having jobs. Health issues--really serious health issues. Nate mentioned the trailer parks. I think out of eight of the people that we visited, one was on dialysis, one person's liver was failing, kidney failure--
> Nate: Congestive heart failure.
> Dylana: Congestive heart failure.
> Nate: Cancer.
> Dylana: Cancer. Like everywhere we go, there are really serious health issues that have only been exacerbated by the storm and living in mold and not having all the proper things that we need.

These are, of course, exactly the same patterns described in work on the climate gap in environmental health. However, while the climate gap literature so far addresses the

consequences of climate change itself and the consequences of climate mitigation strategies, work on the climate gap has so far under-represented the ways in which *adaptation* to climate change intersects with pre-existing patterns of socioeconomic inequality and social hazard. This is likely to be the result of the climate gap literature's origins in environmental justice and environmental health, fields which have historically concentrated on issues of air pollution and toxic chemicals, both of which are more strongly associated with emissions reduction than with adaptive strategies. Part of this is also the result of historical accident – in terms of climate change policy, adaptation has only really been gaining attention in the United States over the past decade or so, particularly in comparison to mitigation. (In the wake of Sandy, a number of scholars are concerned that the push for more and better adaptation policies might "crowd out" continued efforts toward mitigation, which are still absolutely necessary to reduce the overall impact of climate change.)

Nonetheless, as the previous chapter explained, adaptation is not a universally positive action. While it is often represented by scholars, policy-makers, and the media as a totalizing effort to reduce vulnerability, the positive and negative effects of adaptation policy are not evenly distributed {Ebi 2006a; Shonkoff 2009; Sze 2009; Mastrandrea et al. 2010; USNCA 2012; Jesdale 2013. In a similar vein, poorly constructed adaptation policies can make permanently negative long-term changes which restrict future adaptation options through path dependency (Hoppe, Wesselink, & Cairns, 2013; Levin, Cashore, Bernstein, & Auld, 2012; United States Global Change Research Program 2001). As noted previously, any given hazardscape, including the distribution of vulnerability, is the product of historical trends and social choices. Thus actions to mitigate or change that hazardscape must be undertaken in the context of pre-existing social difference, marginalization, and facilitation. In the context of climate change adaptation, no less than mitigation, this means that any adaptation action needs to include the historical-social power structures which contextualize a given adaptation initiative.

Vulnerability during Sandy was highly correlated with whether a neighborhood had basic economic amenities like grocery stores where residents could buy food and water after the storm. Most of the affected residents I spoke to were anxious that the storm would cause the permanent closing of the few stores in the neighbourhood, many of which remained shuttered in the year after the storm when I was doing my field work. Until the power was restored five months afterwards, the only fresh groceries in Rockaway Beach came from a Rite Aid which ran on generator power. Coney Island was in a similar situation:

> "Unless they get the funding and the money to reinvest in the community and put these businesses, back in place the community is suffering because they don't know where to go to wash clothes. They don't where to go to get a breakfast. Like, I saw a lady screaming and yelling outside in the street milk, milk, milk and there was no place to get milk." (Edward Malave)

Economic redevelopment was a critical topic of conversation for everyone I talked to, with even the local elected officials expressing concern that because areas in South Queens (e.g. Rockaway Beach and Far Rockaway) and coastal Brooklyn (e.g. Coney Island, Sheepshead Bay) had been comparatively under-developed in the past, they would not get appropriate attention and funding to build new economic activities. Again this highlights a failing of the mainstream conception of

resilience as "bouncing back" – i.e. when the pre-disaster state of affairs was highly vulnerable, returning to that state just maintains a pattern of vulnerability and inequality. As a resident of the Rockaways put it while discussing the differences between Rockaway Beach and the wealthier areas of Belle Harbor or Neponsit, "they're not moving and spending their money in the poor neighborhood, they're coming and doing the work but keeping the money in the rich neighborhood."[12]

Furthermore, there is no bright line between emissions mitigation and adaptation. Just one example of this emerged during Sandy, when the electricity co-generation plant which supplied electricity to buildings on NYU's lower Manhattan campus was still running even when the larger electricity grid had failed. As a result, the co-generation plant, which originally aimed to reduce emissions, became a major instrument for resilience, and for several days buildings powered by the plant were the only ones with electricity below 14th street. Local residents who remained in place in their darkened buildings gathered in orderly lines as NYU opened up the student center's functional power outlets to the city's phone chargers.

Overall, mitigation strategies tend to favor the building of decentralized energy production, the increased robustness of local economies to reduce transportation emissions, and an increasing reliance on clean technologies that are less vulnerable to interruptions in the supply of fossil fuels - all strategies that simultaneously increase resilience. Yet adaptation can fall into any of the "maladaptive" strategies outlined above which risk causing even greater burdens to fall on vulnerable communities. Thus there needs to be an explicit recognition that adaptation, like any public policy, runs the risk of socially unjust outcomes. Attendant upon this recognition is the need for all adaptive policies to include within them an explicit question of how the proposed strategies will affect those most at risk. An awareness of social difference means that those seeking to adapt to climate change must not only include, but *privilege* the interests of those with the least power in society. A failure to do so is not only unjust in a moral sense but undermines overall collective social resilience in the long run, putting everyone at risk regardless of their socioeconomic status.

4.3   The adaptation gap in Post-Sandy Reconstruction

The following section details observations of how the City of New York took action after the storm to "build resilience" to future storms. I deliberately bound my investigation to the city level for brevity and clarity, because I aim to investigate both how the city used the idea of resilience discursively, and how it embodied resilience through its post-disaster recovery programs.

Specifically, I begin by examining the way that the city's response thoroughly failed to address immediate needs after the storm. This was not through a lack of planning, but because when the storm hit the city threw out the plans it already had. Yet the underlying rationale for throwing out the plans, I argue, is because of the doctrine of disaster exceptionalism – Sandy, despite being predicted by the city's own advisory panel on climate change, and following on from an almost equally devastating event in 2011's Hurricane Irene, was seen as an event which the city could

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[12] Interview #1

never have anticipated (Aerts & Wouter Botzen, 2011; Horton, Gornitz, Bowman, & Blake, 2010; Hunt & Watkiss, 2011; Metro New York Evacuation Project 2011; "Responding to Climate Change in New York State: The ClimAID Integrated Assessment for Effective Climate Change Adaptation in New York State," 2011; Schmeltz et al., 2013; Sheppard 2013). Failure to take the threat of coastal storms seriously was not the product of ignorance, it was the product of the discursive sidelining of natural disasters – a government cannot prepare for what it does not take seriously.

In a similar vein, the Special Initiative on Resiliency and Rebuilding Report (the SIRR Report), which was the first major policy response, perpetuated both the discourse of natural disaster and the discourse of disaster exceptionalism, rather than trying to address the *underlying* causes of city's failure to incorporate the persistent threat of natural hazard into its urban planning. In particular, the report's bias towards seeing the storm's effects as the product of biophysical, rather than social forces, threatened to perpetuate the myth that climate change could and should be addressed as a solely physical problem

4.3.1 Bureaucratic glaciality

"What was surprising is, I work a ton with [the Office of Emergency Management, or OEM] and I knew there were plans for all of this. And what was surprising is they were sidelined right away." (Senior member of the city administration)[13]

"We spent so many years in developing this plan and to have it tossed aside it just—it was ridiculous. It tore the gut out of this agency and the morale here suffered tremendously." (Staff member, Office of Emergency Management)[14]

A critical element of the botched response to Hurricane Sandy was the way that the city administration discarded pre-existing emergency plans. There are two apparent reasons for this. The first is that many emergency plans are never used in actual emergency situations, becoming what the sociologist Lee Clarke terms "fantasy documents" (Clarke 1999). They exist as static documents, rather than as a workflow that can be effectively employed, when what is needed in an actual crisis situation is agility, the capacity to respond to dynamic circumstances in a flexible way (Harrald 2006). Instead of being practically useful, these emergency plans work as a tool to manifest the local government's authority, its *ability* to respond, turning the plans into performative exercises whereby the local authority shows it would care about its citizens, were an emergency to occur.

The other element was the ghost of Hurricane Katrina. Interviewees from the city government repeatedly said things along the lines of:

"Bloomberg was very concerned about ya know, kind of legacy-type considerations and just generally speaking about avoiding Katrina. I mean that's something you heard of again and again and again, you know the Mayor doesn't want this to be a Katrina."[15]

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[13] Interview #9
[14] Interview #10

Given the legacy of Katrina, its long-term impact both on race relations within the United States and what appears to be a permanent diminishing of New Orleans as a city, it's understandable that Mayor Bloomberg was anxious that his legacy not be dominated by the appearance of an inadequate response. However, throughout interviews and field work it was clear that appearances were the dominant concern. While city employees went door to door surveying post-crisis needs in the poorest neighborhoods that were affected, they did not follow up with assistance beyond basic goods such as food and water. Although the most significant needs were housing assistance such as mold remediation, heating repair, and restoration of electricity, most immediate needs were taken care of by informal networks of family and friends, church groups, and volunteers.

Carlos Menchaca, who was at the time liaison to City Council Speaker Christine Quinn but who has since been elected to the City Council, said in an interview:

> Q: So when exactly did the governmental organizations or larger relief efforts actually make it to Red Hook, like the Red Cross?
> A: We could've not even cared for the Red Cross, they brought up more issues [inaudible 12:02]. I would say in general I think that we saw the presence of government and I know working for government but I'm not working for the agencies that were responsible for the relief and recovery.
> Q: Right.
> A: Stuff, like the things that we all expect to happen. I would say two weeks; it took really two weeks for a full earnest visibility in the government. The trailers started showing up and you saw FEMA in a larger way. They trickled in for sure but their ambitions and their plug into the community was not where I expected them to be. And their nimbleness is clearly not at all possible. So I would say in two weeks we finally saw some support where the first two weeks we were really battling it out as a team of volunteers.

Because the emergency plans had been discarded, and because infrastructure was so dramatically affected by the storm, communication became a massive gap in the post-storm recovery. A woman from Rockaway Park described the situation:

> "I think, communication was really difficult. Cell phones did not work for weeks and weeks. There were -- there was no sort of official response that people were aware of at all. It was, like, weeks of we didn't see anyone or see a Red Cross truck. We didn't have flyers posted anywhere from the Mayor's Office saying what to do. So it was really just like descended into, like, you're on your own sort of thing. So that was, I think, a big problem."[16]

The mayor's office, in its after-action report, asserted that points of contact and official assistance networks were established within four days of the storm making landfall. However, outside of residents in public housing (the New York City Housing Authority, or NYCHA), nobody from the communities that Superstorm Research Lab worked with in Queens, Brooklyn, or Staten Island agreed with this. Within this vacuum, communities did an admirable job of springing into action to help their own, and within 48 hours the Occupy Wall Street protest movement had

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[15] Interview #13
[16] Interview #8

branched off into Occupy Sandy, which became the largest distributor of material aid in the immediate aftermath of the storm, and the largest and most organized source of volunteers (Remes 2016).

In their own after action report, an alliance of New York community-based philanthropists, the North Star Fund, succinctly described the challenge of the disorganized, poorly executed response:

> The challenge of determining the precise number of organizations that provided relief services after the storm is reflective of the challenge of working after the storm. Since there was no clear agency, office, or organization "in charge," many parallel systems were created, and many organizations and agencies worked without formal connections to the city, or formal training in disaster response. There is also no single or coordinated way that organizations active during the storm have been engaged or tracked since the storm. …When asked to name one agency that played the leading coordinating role, there was still no consistent point of view. More than 35% of those responding identified the mayor's office as doing so, followed by 27% identifying FEMA. The New York City Office of Emergency Management was identified by 18.9% for this coordinating role.

Unsurprisingly, formal aid for housing repairs lagged far behind the needs of affected residents. According to the city government's own figures, it took 18 months and the installation of a new city administration to even begin the first construction under the city's much-criticized Build it Back program (City of New York, Office of the Comptroller, & Scott M. Stringer, 2015). Beyond the fact that it took several months for the federal government to appropriate disaster assistance funds, it was clear that both FEMA and the Bloomberg administration was anxious to avoid the waste and perceived corruption of money distributed after Hurricane Katrina.

As a result, the process for getting city assistance was so burdensome that the program's deadlines had to be extended in addition to a significant overhaul of its requirements once the first audits were released (ibid.) These concerns had profound effects, heightening the anguish of affected residents and forcing many to pay for their own repairs with no ability to be reimbursed. As one of our interviewees from Staten Island put it,

> "The main problem, because what you wanted to do, because it happened in October and now you're dealing with the winter coming in, you really wanted to make sure that your house had heat, and you weren't, your pipes gonna freezing had ultimately more damage. Plus you wanted to deal with the mold, but then you also had to deal with your homeowner's policy, insurance, and your flood insurance, and FEMA… So it was just very, very frustrating and not an easy process. So for dealing with trying to get your heat going, we were able to do that. We actually signed up for rapid repair, which wasn't very rapid because it took us months for them to even contact us and we already had a plumber in motion to get the heat going. And as I said, you know, working through the insurance companies and the bank and all that was just, a bit of a nightmare. We were very fortunate, because even our insurance company, they gave us an advance and then ultimately paid us, but there were people we know who never even got, they got maybe and advance, but never got payment from their flood insurance."

…I think what happens with the government when you have FEMA they have small business administration loans, each case is very unique to each person's circumstances, and we went through all the paperwork and everything. FEMA was great, and we started doing the small business administration loan and it really, I wish, they wish they would have been more up front about, about what you really needed to do, cause this fourteen thousand dollars, the first fourteen, you're okay, but then after fourteen thousand you have to get, there's basically a lien placed upon house and you have to go through building permits and other things, so they really should have been a little bit more up front about all the expectations…So ultimately we got approved for an SBA loan, but then they said if we had, being part of the approval process, they would take back the money FEMA gave us. FEMA gave us the money, so then we had to borrow the money, so it made no sense, so, it was a lot of red tape, a lot of confusion, a lot of frustration."

Edward Malave, the pastor from Coney Island, described the frustration of his parishioners due to the confusion between city assistance, flood insurance, and FEMA:

"No one -- everybody is asking many questions and they are getting the wrong answers. And I understand why because they are basically getting to the lower level clerks and they are given just certain answers to give. And usually at the very end, they are the wrong answers, you know, which I'll give you an example of that. Take everything out of your home -- I'm sorry don't take anything out of your home because FEMA has to see it -- wrong answer.

"Get the walls off as soon as possible -- wrong answer. Because that make the resident do all that work and pay it out when actually the city was coming right after to do the work for them without them having to pay for it. And now, there's no way for the city to reimburse them their money. A friend of mine right in front of my house he repaired his boiler he repaired it up water heater does everything. A week after that they knock on his door to do the job for him for free and he already did it."

Damage from Sandy was not covered by homeowners' insurance. Flood losses were, in some places, covered by the National Flood Insurance Program (NFIP; managed by FEMA and administered through private insurance companies), but because so much water incursion happened outside of FEMA's pre-identified hazard zones, many affected residents were not covered.

Additionally, New York City is not a participant in the NFIP's program that provides additional assistance for proactive municipalities who build flood mitigation into their urban planning guidelines. This is not accidental, but the result of federal guidelines for that program which are so narrowly drawn that they only suit areas dominated by single family housing. As a result, New York City, dominated by multi-family housing, is effectively ineligible because the bulk of its planning, and its needs, are not centered upon single family homes. Resolving this problem is now on the agenda of the deBlasio administration, although the Bloomberg administration never made it a priority.

The City's inability to respond to its residents' needs after Hurricane Sandy, however, was not the result of unfortunate guidelines from the NFIP. Instead, it was the result of a city administration that refused to recognize the impending threat from coastal storms, and then in a crisis situation became more concerned about appearances than about having an effective

response which might raise the risk of wasted funding. As long as the city administration, and local governments of other cities, refuse to incorporate climate-related hazards throughout their planning, recognizing them as an inevitable function of urban life and rejecting the doctrine of disaster exceptionalism, these problems will continue to occur.

4.3.2 Discourse of physical risk

The SIRR report was released with much fanfare in the summer of 2013 and has been used as a conceptual structure for the city's rebuilding initiatives after Hurricane Sandy (Mayor's Special Initiative on Rebuilding and Resiliency & Mayor's Office of the City of New York, 2013; Sandy Regional Assembly 2013). The document also guided a revision of the city's master plan for regional sustainable development, PlaNYC 2030. However, the work done by the SIRR has primarily been performative. Because the document is over 400 pages long, it it too large to be useful as a guidance document for the type of "flexible adaptation pathways" called for by the New York City Panel on Climate Change (Rosenzweig & Solecki, 2014

Through the attention shown to storm recovery and long-term planning, the investment of public resources to produce and promote the report, the SIRR report demonstrates the city government's authority as the primary source of guidance and security for citizens (Liboiron & Wachsmuth, 2013). This is in keeping Superstorm Research Lab's interviews with city officials in charge of recovery efforts, who noted that that the mayor's office seemed to be very concerned with the public perception that "this was not another Katrina," and that the city government recognized a duty of care towards residents who had been affected by the storm. Nonetheless, while money was dedicated to hiring canvassers to knock on doors and survey residents about needs, this was not followed up with anything beyond basic relief supplies such as MREs and bottled water.

The SIRR has been praised for the fact that it does make a strong public statement that climate change is an urgent problem for the city, including the threat of sea level rise and increasingly severe storms, which is something which nearby regional leaders, such as the state of New Jersey, have failed to do (Alliance for a Just Rebuilding 2013; New Jersey Department of Community Affairs 2013; Sandy Regional Assembly 2013). Yet its content also reveals that it perceives climate change as a problem which can primarily be addressed through changes to the built environment. The following excerpt from then-Mayor Michael Bloomberg's introduction is a compact reflection of the report's narrative through-line:

> In our vision of a stronger, more resilient city, many vulnerable neighborhoods will sit behind an array of coastal defenses. Waves rushing toward the coastline will, in some places, be weakened by offshore breakwaters or wetlands, while waves that do reach the shore will find more nourished beaches and dunes that will shield inland communities. In other areas, permanent and temporary floodwalls will hold back rising waters, and storm surge will meet raised and reinforced bulkheads, tide gates, and other coastal protections. Water that makes its way inland will find hardened and, in some cases, elevated homes, making it more difficult to knock buildings off their foundations or knock out mechanical and electrical systems. And it will be absorbed by expanded green infrastructure, or diverted into new high-level sewers. Meanwhile, power, liquid fuels, telecommunications, transportation, water and wastewater, healthcare, and other networks

will operate largely without interruption, or will return to service quickly when preventative shutdowns or localized interruptions occur.

The SIRR Report implicitly and explicitly demonstrated a conception of resiliency in line with the priorities of the mayoral administration, namely a favorable climate for corporations, a continuation of many of Mayor Giuliani's "broken windows" approach to social problems through policing, and minimal attention paid to growing economic and political inequality. Although the replacement of Mayor Bloomberg with Mayor Bill de Blasio at the end of 2013 brought with it a more populist approach to city governance, the de Blasio administration has not[17] made any concerted effort to demonstrate a revised or renewed idea of resiliency which contravenes the SIRR report.

While some progress has been made due to extensive public pressure, community and labor groups continue to make similar critiques of the de Blasio administration's storm response as of the Bloomberg administration. While this raises important questions about the role of individuals in the development of public conceptions of resilience, as well as demonstrates a need for more investigation of the degree to which institutional inertia plays a role in the New York City Government's approach to storm relief, that issue is beyond the scope of this chapter and dealt with by other scholars (Bergren et al., 2013; Liboiron & Wachsmuth, 2013; Powell, Hanfling, & Gostin, 2012; Tollefson 2013). What I note here is the degree to which the New York City Government's idea of resiliency is dominated by a technocratic approach to problem-solving and ignores the larger social issues which are no less critical.

The SIRR report, among many other Sandy-related documents and publications, also illustrates a tendency for stakeholders to use the word "resilience" when referring to adaptation actions. Not all adaptation actions increase long-term resilience in the face of environmental hazard. Some may even be maladaptive, causing greater problems for long-term adaptive actions. Discursively, the term "adaptation" carries a connotation that this is just one proposed adaptive action out of many, whereas the term "resilience" carries an attendant assumption that the result of an action (greater resilience) will be positive. It is difficult to argue against greater resilience in the face of environmental change. In short, an initiative which is labeled "resilience" is less likely to be subject to critique than an initiative which is labeled adaptation, a term which is *de facto* synonymous and yet rhetorically carries much less normative weight.

There are two consequences to this terminological conflation. The first is that advocates and academics need to bring increasing critical scrutiny to bear on initiatives labeled with "resilience," perhaps more scrutiny than would be applied to initiatives labeled "adaptation." The second consequence is that the extensive critical literature regarding climate change adaptation can be applied to the SIRR Report and other so-called resilience programs.

Public criticism of the plan has predominantly focused on the plan's lack of public engagement beyond elected officials. There are no ongoing provisions for public comment or consultation (Alliance for a Just Rebuilding 2013; Kellerman et al., 2014; Sandy Regional Assembly 2013).

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17. As of March 2015

Nor are there provisions to review the plan or its implementation beyond pre-existing elements of the NYC city planning process. The engagement with the community is one-way, offering outreach but no opportunities for participation beyond an email form on the website. Other critiques have included the limited availability of information on public health impacts or infrastructure failures, and the lack of any provisions to increase the availability of public information with regard to public health (Sandy Regional Assembly 2013; Manuel 2013).

In a move reminiscent of the city's reluctance to admit that the World Trade Center collapse and subsequent recovery efforts led to widespread lung problems for both affected residents and workers at the site, the city also has no dedicated program designed to address problems associated with widespread sewage contamination (Kenward, Yawitz, & Raja, 2013), chemical exposure, or black mold exposure. Likewise there are no provisions to offer mental health support to community volunteers. Public health discussion in the SIRR Report is limited to public health infrastructure, and to a lesser extent the provisions for an improved emergency notification system and expansion of the city's Community Emergency Response Training (CERT) program beyond the pre-storm cohort of 1500 registered volunteers for a city of approximately 12 million people - 8000 residents for every volunteer.

Numerous areas of the city are vulnerable to storm surge and infrastructure failure but managed to escape the worst of the Sandy flooding. Yet the SIRR makes no provision to identify areas of concern that might be affected by future storms, strong winds, sea level rise, or erosion. As the Sandy Regional Assembly (SRA), one of the major regional coalitions working on post-Sandy issues, points out, there are no provisions to reduce the impacts of hazardous chemicals or other types of contamination in Significant Maritime and Industrial Areas. It also doesn't increase the resources available for the enforcement of pre-existing public health codes that are routinely violated (Sandy Regional Assembly 2013, p. 6).

The Sandy Regional Assembly also recommended the establishment of Community Resilience Centers, which would provide coordinated local services for Climate Adaptation, Disaster Relief, and Evacuation Coordination. These are absent from the SIRR. In all, though the SRA identified 23 local projects which were shovel-ready, low-cost, and relatively high-impact in terms of building social resilience, only one of their recommended projects was specifically mentioned in the SIRR Report: replenishment of sand dunes for coastal protection.

In addition to the Community Resilience Centers, here is a selection of some of the other projects which were not prioritized: Providing go-bags and other public emergency preparedness supplies; technical assistance grants for community organizations; and specific resilient landscaping suggestions for buildings owned by the New York City Housing Association (aka NYCHA, the citywide public housing authority). However the SIRR Report does propose "a study" to investigate such landscaping.

Another coalition, the Alliance for a Just Rebuilding (AJR) emphasizes economic inequality and connection to resilience, arguing that "recovery measures should not replicate the circumstances that made so many New Yorkers so vulnerable in the first place" (Alliance for a Just Rebuilding

2013). Rather than the emphasis on infrastructure an building codes, AJR's four central platforms are good jobs, affordable housing, sustainable energy, and community engagement. They critique institutions such as the New York City Economic Development (NYCEDC) corporation for prioritizing the needs of the rich over job creation and wealth creation in underserved communities. I myself saw this in post-Sandy recovery meetings in 2013[18] which included NYCEDC representatives; they made no effort to conceal the fact that a third of the Sandy redevelopment money ($84 million) they had been allocated would go to property developers via the "Neighborhood Game Changer Contest," the guidelines of which explicitly favored the development of large scale retail and office spaces. This plan was later abandoned by the de Blasio administration and the money reallocated. Nonetheless, as of 9/30/14, two years after the storm, only $12 million had been spent on business recovery programs out of $266 million allocated.[19] It is unclear why there is such an enormous discrepancy between these figures, although at least some of the problem may stem from the extremely slow rate at which federally allocated Sandy relief monies have been paid out. The majority of the city government's allocations come from the Department of Housing and Urban Development (HUD) block grant program; as of 9/30/14 approximately $1.8 billion of HUD's $15 billion post-sequester allocation for Sandy relief had actually been paid out.

Likewise, funding allocations demonstrate a clear distinction between the Bloomberg and deBlasio administrations in terms of small business support. As of 12/31/13, one year and three months after the storm, only 3 applications out of 75 submitted had been approved for business assistance, each of which had been given $500,000. Under deBlasio, funding was capped at $100,000 but the process was streamlined and more resources were allocated to the program. As a result, by mid-October 2014, the two-year anniversary, 104 grants had been approved out of 249 applications.

However, drilling down into the distribution of these monies once again demonstrates an imbalance. Of those 104 grants and loans, none had been allocated to businesses in the Bronx. Only 8 grants had been given to businesses in Queens, where the Rockaways and other neighborhoods around Jamaica Bay were dramatically affected by the storm. By contrast, 43 grants were made to Manhattan businesses and 33 to Brooklyn. Out of these grant monies, only 65 full time jobs were retained, 83% of which are considered "low and moderate income" (LMI). 16 part-time jobs were created and retained, 95% of which were considered LMI. With less than one job saved per business, these are alarmingly low numbers for $11 million in grant money, prompting additional questions about how that money was actually spent. A report issued in 2014 by an alliance of environmental and labor organizations (Kellerman et al., 2014) specifically connects social resilience to disasters with the need for consistent employment.

Yet while this aspect of reconstruction is under-recognized in the SIRR report and public spending, it's still only a narrow view of social resilience, one which leaves out the extensive social connections which also contribute to a resilient region. There are functional connections such as

18. While Mayor Bloomberg was still in office.
19. All of the numbers in this section are obtained through the City of New York's Sandy Funding Tracker and the Good Jobs New York online database of Sandy funding.

the need for community development to support grocery stores and other suppliers of basic needs which must be accessible when public transportation is unavailable. Officially sanctioned first responders, such as those who are affiliated with the fire department, don't just have a role in the aftermath, they play a major role in emergency preparation (Keim 2008) and community building (Tompson, Benz, Agiesta, Cagney, & Meit, 2013a) - a role which is noted in the proposal for Community Resilience Centers described above. There are the informal interpersonal networks which offer support in disaster situations, such as the fact that one's neighbors tend to be de facto first responders in a crisis, and the ability to gain support from family and friends is a critical stopgap in times of constrained resources (Akter & Mallick, 2013; Aldrich 2012; Brown & Westaway, 2011a; Finch et al., 2010; Gallopín 2006).

Moreover, Klinenberg's work in Chicago highlights the connection between disaster mortality and solitude - people with fewer social connections are less likely to seek help in a crisis which can be the difference between life and death (Klinenberg 2003). This is echoed in a study of post-Sandy resilience which made empirical connection between people's sense of trust in their neighbors and long-term recovery outcomes (Tompson et al., 2013a). On a macro level, this goes back to the intersection of society and disaster discussed in the first chapter, whereby the effects of disaster are shaped by the social relationships within society:

> "Disasters, and how well or poorly systems fare in them, are a gauge of the success or failure of the total adaptation of the community. In the way we structure consciously or unconsciously, intentionally and unintentionally, our interactions with the environment, we can frequently be the cause of our own hazardous situation" (Oliver-Smith 1999a, p. 27).

Building resilience through climate adaptation, of which post-Sandy recovery is one example, is about much more than sand dunes.

4.4   Addressing the adaptation gap with social resilience

> "We were not alerted that there was the potential that there could be flooding. Our community advocates didn't say anything to us, there was no evacuation planning, and I feel like there should have been some evacuation planning and there was none." (Interviewee #3)

As a recent paper points out, "we cannot perceive natural disasters as they are; instead we apprehend their complex reality through stories, metaphors, discourses, and other interpretive devices" (Gould et al., 2016). How we choose to interpret disasters – the stories we tell about environmental hazards – are the fundamental element of how we make political choices about disaster preparation and mitigation. The doctrines of disaster exceptionalism and natural disaster, as described in Chapter 1, are simply powerful stories about how disasters work and how people should respond to them. As such, they can be changed.

Stories are not told in a vacuum. As illustrated in Chapter 2, they occur within a larger hazardscape – a spatially oriented web of economic interactions, power relations, and political choices – which in turn are mediated through localized assumptions about environmental hazard. Yet the state is also a key player in how these hazard-stories are told, and they work hard to shape these stories in their own interests (Boin et al., 2008a; Brown et al., 2011; Gould et al.,

2016; Hewitt 1983). While crises and catastrophes are opportunities to disrupt these narratives, it is the responsibility of civil society to challenge the way power can perpetuate itself at the cost of resilience (Pelling & Manuel-Navarrete, 2011; Tompkins et al., 2008; Walsh-Dilley & Wolford, 2015).

The role of civil society is compounded by the fact that vulnerability and resilience are the products of social choices rather than environmental circumstance, as illustrated in Chapter 3. These choices, as described in this chapter and the previous one, have the power to either reinforce pre-existng structures of power that create vulnerability, or to reorient society to be more resilient to shocks and stressors. It is difficult to avoid the fact that the recent election in the United States, in which Donald Trump won the electoral college despite a popular vote loss, is an exemplar of this. Because the Democratic party maintained a rhetorical commitment to social opportunity but enacted policies over decades which did nothing to challenge the status quo – the power structure in the country which created and ever-widening gap between rich and poor – they undermined their base and, more importantly, helped to create social conditions in which the so-called disruptive candidacy of Trump might thrive. Neither party challenged the relations of power which left many Americans feeling a sense of fear, instability, and alienation from the political mainstream. If the Democrats had actually chosen to enact transformative policies, supported by transformative rhetoric, the country might have been less receptive to the empty promises of the authoritarian right. As a result, vulnerability grows, resilience is undermined, and funding is eliminated for fundamental climate research. There is nothing inevitable about this situation.

One of the key factors in whether neighborhoods significantly affected by Hurricane Sandy recovered more quickly or more slowly is whether there was a sense of trust between neighbors, and whether there was a sense of, if not cohesion, solidarity between members of the same community (Cowan 2014; Schmeltz et al., 2013). As a survey from the Associated Press and NORC (Tompson et al., 2013b) reported,

> Individuals in slowly recovery neighborhoods are less likely to believe that, generally speaking, most people can be trusted (31 percent vs 44 percent) and are more likely to believe that you can't be too careful in dealing with people (68 percent vs 53 percent) compared to neighborhoods reporting greater levels of recovery. Individuals in slowly recovering neighborhoods are also less likely to say that Sandy brought out the best in people than individuals in neighborhoods reporting greater levels of recovery (63 percent vs 81 percent).

Yet Sandy, just like most major disasters before it, *did* bring out the best in people on a local level (Clarke & Star, 2008; Remes 2016; Solnit 2010). In addition to the mixed efforts of the usual state and nonprofit suspects, a self-organized response to community need materialized in the form of Occupy Sandy. Spontaneously emerging out of a sense of community identity and spawning a number of spinoff organizations that are still hard at work four years later, Occupy Sandy was studied by the Department of Homeland Security and labeled "The Resilient Social Network." The report prepared for the federal agency noted that

"In the days, weeks, and months that followed [Superstorm Sandy], 'Occupy Sandy' became one of the leading humanitarian groups providing relief to survivors across New York City and New Jersey. At its peak, it had grown to an estimated 60,000 volunteers…Unlike traditional disaster response organizations, there were no appointed leaders, no bureaucracy, no regulations to follow, no pre-defined mission, charter, or strategic plan. There was just relief." (Homeland Security Studies and Analysis Institute 2013b, p. 7)

What Occupy Sandy demonstrates – although in the annals of disaster studies it is by no means alone in doing so – is that resilience is a function of community solidarity, mutual aid, trust, and local organizations such as churches and nonprofits. Supporting these elements of *social* resilience should be a foundational principle of official responses to disaster such as the SIRR Report. The following, final chapter identifies some of the more significant reasons that social interventions are so poorly integrated into disaster policy, and by extension climate adaptation. As noted in Chapter 1, one of the many consequences of the two doctrines is a technological bias in the discourse of environmental hazard, and this technological bias crowds out social solutions which might be equally, or more, effective.

Following on from this, the next chapter also asks the question of where climate adaptation might go, if social factors were more thoroughly considered: from maladaptation to transformation.

5 Adaptation and Transformation

"But there is nobody that can be blamed, this was an unimaginable disaster." (Interviewee #2)

"Q: For your particular community, would you classify the disaster as man-made or natural?
A: I think this was a man-made disaster.
Q: Why do you think it was a man-made disaster?
A: The fact that hollowing out of the land where the Bell Parkway where they have to sand the Bell Parkway, they leveled that. There were trees in that area before, there were sand dunes before that I would think kept the water back. That is completely flat now, so once the tide rises or raises, the tide can come in and it goes under the bridge and it crosses the parkway and it goes onto the road and that's what's happened. It's -- my guess is if we would have a flood, if they didn't start that work and we would have had a flood, it certainly would not have been to that magnitude. Absolutely not. I have no reason to believe that. Have no reason to believe that. So I do believe, yes, it was natural, but the magnitude of it, the intensity of it was certainly man   made. Absolutely." (Interviewee #3)

5.1   Moving beyond "natural" disasters

Adaptation is often represented as constrained by a set of exogenous, fixed, biophysical, economic, or technological limits, whereas in reality limits to adaptation are socially contingent, endogenous to the social structure itself. As Adger et al. argue, the limits to adaptive actions are, in fact, primarily social, a function of political will and socioeconomic conditions, but the public conversation about adaptation also reflects a technological bias that excludes political considerations from analysis (Adger et al., 2009b).

There is a political purpose to representing adaptation limits as fixed, because many scholars and activists are worried that too strict a focus on adaptation can take away from the need to mitigate carbon emissions. Indeed, this is backed up by empirical research; one major finding of the Superstorm Research Lab's white paper is the way that public action on climate change has shifted very much in favor of adaptation and "resilience," crowding out mitigation in the public marketplace of ideas. This is potentially quite damaging for the larger movement to drive global climate solutions with local initiatives; before the storm, New York City had been a global leader on greenhouse gas mitigation (Bergren et al., 2013). By treating adaptation as a limited, last-resort option, activists and concerned scholars hope to maintain pressure for mitigation strategies, to avoid harm in the first place rather than debating responses to the locked-in legacy of greenhouse gas emissions.

Yet climate change is already occurring, and efforts at mitigation need to be complemented by adaptive strategies that reduce vulnerability and build long-term resilience in the face of increasing hazard. Folke et al (2002) highlight four key factors for resilient socio-ecological

systems which also hold true for social responses to a dynamic climate: (1) Learn to live with change and uncertainty; (2) Nurture diversity for reorganization and renewal; (3) Combine different types of knowledge for the most effective responses to change; (4) Create opportunities for self-organization, to allow the system to recover in the absence of outside help. Thus it becomes clear that long-term resilience demands changes in the social system itself, becoming more diverse, more agile, and less stratified. Importantly, these changes that foster long-term resilience are primarily social in character – an element which is missing from the most dominant responses to environmental risk.

Why does the commonly held conception of resilience so poorly account for social factors? Mark Pelling cites the disciplinary "division of labor" in science between physicalist and socio-critical approaches, "which has not only separated physical and social sciences but placed them in competition with one another for access to research funding and political influence" (2001, p. 172). Despite growing attempts to incorporate interdisciplinary work into research funding models, the persistence of disciplinary approaches in the review of such proposals make it difficult to fund interdisciplinary projects, and because university-level research priorities are tied to those of private funders, this carries through to the structure of work in academic institutions.

Just as Eric Wolf (2010) saw the separation of academic disciplines as inimical to work on fundamental problems in political ecology, the persistent failures of academicians to work outside their field – and the many social structures that punish them for doing so within the academy – create narrowly focused solutions which often target symptoms rather than underlying social problems. Likewise, the perceived hierarchy of knowledge whereby techno-scientific approaches are valued more highly than "soft" social approaches can create an environment where social scientists struggle to be heard. As a result climate research, and climate policy, is heavily biased toward technological rather than social solutions.

5.2   The technological bias in adaptation

The public conversation around climate change, particularly that element of the conversation that involves activists and academics, has long contained a tension. On the one hand, many academics (and some activists) express the desire to adhere to the norms of scientific convention and present the implications of emerging data conservatively, being extremely cautious with regard to letting conclusions outrun available data. However, as many activists (and some academics) point out, the potential consequences of climate change are so dramatic and severe, the ramifications of emerging data such as collapsing ice sheets and melting permafrost so significant, that guarded interpretation of the data is at best overly cautious and at worst irresponsible.

Both of these stances have merit; both represent totally legitimate assessments of the available data regarding climatic change. This does not mean that they are mutually contradictory, despite the fact that they are interpretations of the same body of research. Within the realm of climate change policy, the technological bias tends to manifest not only in a biophysical approach to hazard mitigation that perpetuates the doctrine of natural disaster, but also within the narrative of technological triumphalism.

Triumphalists, generally speaking, place their faith in the ability of technology to solve social-ecological challenges. In the climate change debate, this attitude manifests in a range of policy positions, from the monumental (such as those in favor of seeding large portions of the ocean with ferrous sulfate to stimulate ocean bacteria, or those who hope to build mirrors in space to reflect solar energy), to the incremental (such as the push for "carbon sequestration" and other technologies which allow the continued burning of fossil fuels as long as they do not "escape" into the atmosphere), to the blithely capitalistic, to the possibly misleading (for example, the public relations activities of large oil and gas companies).

Another potential consequence of the technological triumphalist angle in the development studies context is the argument that the significance of climate change is overblown compared to the significance of global poverty, and the money and effort that is going into the climate change debate (and associated technologies) should be diverted toward poverty eradication instead (Pielke, Prins, Rayner, & Sarewitz, 2007). This argument is predicated upon the idea that as the effects of climate change become more severe in wealthy nations, market forces will drive the development of low-carbon and adaptive technologies. Thus even among the proponents of technological triumphalism, there is an argument to be resolved about whether or not the market by itself can drive the sort of innovation needed to resolve climate change with technological solutions. However, attendant within this discourse is an attitude of optimism about the future, a willingness to trust that humans can solve any ecological problem.

Underlying triumphalism is the doctrine of disaster exceptionalism: the goal is not to cope and adapt to hazard, but to eliminate it entirely, to control not only the emissions but the *consequences* of those emissions. As many have noted, this focus on predicting, controlling, and otherwise "managing" physical hazard weakens the response to environmental hazards and disasters (Christoplos et al., 2001; Hewitt 1983; Oliver-Smith 1999a; Pelling 2001; Tompkins et al., 2008). The myth that technology is able to control (rather than *mitigate*) environmental hazard leads to a false sense of security in which the public is led to believe that predictability is the same as eliminating hazard.

Additionally, the dominance of a rarified technocratic discourse interferes with democratic oversight of public action. Sheila Jasanoff argues that studying the environment, or invoking the environment in any way, necessitates using science and technology as a lens through which to understand it. "The environment today is replete with invisible, elusive, fearful, yet wholly 'real' entities revealed to us by science: acid rain, ozone depletion, pesticide tolerance, carrying capacity, overpopulation, species loss, and most recently climate change" (Jasanoff 2010, p. 236). Yet this interpretation, conditioned by an urban academic reality in which phenomena like species loss are invisible, ignores the way that environmental factors co-constitute many people's lives.

For one thing, knowledge about climate change is not only mediated through discourses of science, it manifests in local knowledges and epistemological systems that are not validated by the dominant construction of science. These knowledges and systems, by dint of exposure to the changing environmental system, have long recognized that weather patterns are no longer the

same, that pollutants are interfering with the previously known ecological system, because to derive livelihood from land is to observe it meticulously (De la Cadena 2015; Nadasdy 2007; Orlove, Chiang, & Cane, 2002). Jasanoff is correct that observations are not the same as explanations; one can watch trees die without having access to the knowledge of acid rain. Nonetheless, her view reinforces a popular idea that environmental understanding is limited to those who have gained access to the appropriate rung on the hierarchy of knowledge, and it is this interpretation that enables and rewards a more limited techno-scientific approach even when the problem is predominantly social.

Complicating this is the fact that human societies display a cognitive bias in which certain types of threats (e.g. major disasters or terrorist attacks) that are both unusual and especially unpredictable are given a disproportionate amount of attention (Klinenberg 2003; Seneviratne et al., 2012). More routine threats, such as seasonal storms, are less feared both because they are seen to be more predictable and because they are seen to be more easily controlled. However, it is not attention-grabbing catastrophes which cost the most lives, but less headline-grabbing, slower-moving disasters, in particular heat waves and periodic flooding (Cutter 1996; Mastrandrea, Tebaldi, Snyder, & Schneider, 2011; Wisner et al., 2004).

The techno-scientific bias, the cognitive bias in which attention is paid to some disasters and not others, and the two doctrines of natural disaster and disaster exceptionalism create, together, patterns of thought which reinforce fallacious assumptions about how disasters happen and how best they can be prepared for – or whether they should be prepared for at all.

Similarly, while they may be put in place with the best of intentions, resilience-building adaptation policies tend to not just operate within but to reinforce the status quo. This is true of the SIRR report and the initiatives that have followed it, identified through empirical qualitative research in Angola (Bujones et al., 2013), and echoed in policy analysis of projects sponsored by the World Bank, DfID, Christian Aid, and the Pilot Program for Climate Resilience (Brown 2011). This is, perhaps, only to be expected; very few policies overtly aim to destabilize existing social structure. However, the dominant social structure is not only the progenitor of climate change, it also perpetuates inequalities in disaster response and maintains the techno-scientific approach to socioenvironmental problems which has been shown again and again to be ineffective (Pelling 2011). As Brown notes, "at the heart of a resilience approach is the recognition of multiple states of equilibria - but what use is resilience if you want to change structures?" (Brown 2011, p. 41)

One response to this technocratic bias is to pay much more attention to adaptive capacity, to expand the range of adaptation options available to households, communities, and regions. The command and control model of technocracy is incompatible with the empirical findings that biophysical threats are unpredictable and that the social conditions which mediate the effects of the hazard are also both internally and externally dynamic (Seneviratne et al., 2012).

Another response to technocratic bias and its attendant problems is to view adaptation to climate change as an opportunity to escape the conceptual and political rut that causes maladaptation. As noted in Chapter 3, adaptation to climate change can either work within – and reinforce – the

patterns of power and inequality which create vulnerability, or they can challenge these patterns and attempt to change them. While the overall purpose of doing so would be to build resilience to climate change and other environmental hazards, it would work in parallel to build social resilience to a range of shocks: economic, political, and cultural.

Within the growing literature analyzing adaptation to climate change, particularly the social dimensions of adaptation, there is a clear need to differentiate between these two approaches to adaptation. This need is both theoretically important and politically practical, as it is difficult to advocate for an alternative vision of adaptation if one cannot describe it. Within academic circles, a broad distinction is emerging between adaptation which is "incremental" and that which is "transformative", centered upon whether the adaptive policies under consideration embrace or challenge the existing, dominant, political or societal status quo. In summary, incremental adaptations work within an existing social system, including power dynamics and cultural patterns of resource consumption, that in many ways has given rise to the problem of climate change in the first place. While incremental adaptations may indeed reduce the overall risks posed by a rapidly changing climate system, they tacitly retrench these unsustainable practices and norms which are structural in nature and should be challenged on a systematic social level if we, as scholars and engaged citizens, genuinely identify them as core elements of our increasingly heated situation.

The idea of transformational adaptation has been defined by scholars working on the social impacts of climate change in a range of disciplines, international development, political ecology, environmental studies. The most prolific scholars have included Mark Pelling and Karen O'Brien, whose most recent paper describes transformational adaptation as "non-linear changes...radical shifts, directional turns, or step changes in normative and technical aspects of culture, development, and risk management" (Pelling, O'Brien, & Matyas, 2015, p. 113). Other scholars have described it it variously as "the capacity to cross thresholds into new development trajectories" (Folke et al., 2010, p. 20), "the capacity ... to create a fundamentally new system when ecological, economic, or social structures make the existing system untenable" (2010, p. 22), "changes to practices, lifestyles, power relations, norms, and values" (Brown 2013, p. 112), and challenges to "power imbalances in society that encourage, create, and sustain vulnerabilities" (Devereux & Sabates-Wheeler, 2004, p. 9). But as Katrina Brown notes, "there is no single agreed definition or understanding of transformation, and many normative assumptions abound, not least about the assumed desirability of transformational change" (Brown 2013, pp. 113).

There are, in effect, two overall types of adaptive intervention. One type of climate adaptation seeks to work within the social structure that already exists. The other type identifies some fundamental characteristic, or characteristics, of social structure as an underlying problem that must be changed in order to adapt effectively and equitably. The next section describes this latter type of adaptation – *transformative* adaptation – in more detail. To do so, it is important to understand what social structure is, and how it might be changed in the interests of adaptation.

5.3 Conceptualizing transformative adaptation

5.3.1 What is transformation?

The intersection of culture, rules, and materiality that conditions both real and perceived adaptive capacity can be referred to as social *structure*. Structure is historically contested in social theory, with the primary debate being whether social structure is best defined, interpreted, and perceived through its material characteristics or as a linguistic-conceptual construction which governed society. Strongly Marxist approaches are generally thought of being in the materialist camp (thus it carries overtones of historical determinism) whereas more critical or "postmodernist" approaches tended to emphasize the elements of structure which Foucault described as "soft power" which relied on ideas, rather than arms, to dominate social organization.

William Sewell sought to reconcile these perspectives with a description of structure that was both discursive and material, while recognizing the agency of actors and communities within the structure, including the ability of actors to change the structure. Thus he defines structure as "mutually sustaining cultural schemas and sets of resources that empower and constrain social action and tend to be reproduced by that action" (Sewell 1992, p. 28). In a later paper asserting that historical events are actually "sequences of occurrences that result in transformations of structures" he notes that social change tends to happen in a non-linear fashion, where there may be a build up of pressure for change, but it is an event which catalyzes social change and brings about a cascade of effects (Sewell 1996, p. 844).

This cascade of effects is both the cause and the effect of structural change - both because the change that causes the overall structural transformation must be significant enough to affect the structure, and because once a major element of social structure changes it prompts a series of contingent changes throughout the rest of the structure. This is in contrast to non-historical events, or "ruptures", which are "neutralized and reabsorbed into the preexisting structures in one way or another." From a Marxist perspective, this can be considered akin to the difference between revolution and reform. In the climate change adaptation literature, this is the difference between incremental adaptation and transformative adaptation.

Current scholarship on climate change adaptation makes a distinction between "incremental" adaptation and "transformative" adaptation, but this distinction is underspecified. Early scholars writing about this simply distinguish transformative adaptation as being somehow more significant than "incremental" adaptation, either intentionally or unintentionally (O'Brien, Sygna, & Haugen, 2004). Incremental adaptation is later refined as adaptation which responds to changes in climatic or environmental systems but does not actually attempt to change the underlying systemic problems which have given rise to the original environmental changes.

In his 2010 book, Mark Pelling describes adaptation as a social and political act, rife with normative choices. More importantly, he argues, it is an opportunity to make better sociopolitical choices about reducing environmental risk. He distinguishes between resilience, transition, and transformation, with resilience accommodating existing social assumptions and patterns, transformation irreversibly changing them, and transition lying in a liminal space in between (Pelling & Dill, 2010). O'Brien notes that while some see transformation as a key to a necessary, sustainable future, the change in social order represents for others "a contraction of freedom that

will result in chaos and disruption. It can be perceived as dangerous by some and instrumental by others" (O'Brien 2012, p. 670) Nelson et al (2007) describe adaptation as "non-linear," similar to non-linear feedback effects in climate systems whereby changes in the system reach a tipping point.

Beyond this tipping point, a cascade of changes occurs throughout the system, many of which are self-perpetuating. To take sea level rise as an example, incremental adaptations would include building oyster beds to dissipate wave action on the coastline, changing building codes to prevent any new construction within a certain distance of the current high water level, or raising insurance rates for homes and businesses close to the coast. Transformative adaptation actions targeting sea level rise would include mitigating carbon emissions (it is important to recognize that while adaptation and mitigation are often recognized as two different classes of climate change actions, mitigation can also be seen as an adaptive action to the extent that it is undertaken to prevent or mitigate future harm), or resettling entire coastal villages (such as is happening with a number of Inupiat villages in Alaska).

However, as with resilience, we have to ask the question "adaptation to what?" and "adaptation for whom?" While the resettlements are transformative for Alaskan villagers, they don't substantially transform life patterns for people outside of those villages. In the case of resettlement, it is only when displacement occurs on a massive scale (for example, most of the residents of Tuvalu moving to New Zealand, or the diaspora from New Orleans after Hurricane Katrina) that transformation occurs outside of a small sociocultural group. Thus, even transformative adaptation has to be considered in the context of scale - communities, regions, states, governments, institutions, and so on.

Thus thinking about what *transformation* is requires a shared definition of what is being transformed. In this it is Sewell's definition - resource distribution, hierarchies of power, and cultural schemas – that is most useful for defining the boundary between incremental and transformative adaptation. Incremental adaptation does not change social structure, transformative adaptation does.

The scale at which you identify a social structure (i.e. village in the case of Alaskan Inupiat, or regionally in the case of Hurricane Sandy) can also define the scale at which you measure an adaptation. To take another example, California's greenhouse gas emissions law is an adaptive action that legally affects a state-level scale. Thus, it directly affects social structure on the state level. However, California is networked within both the social structures of the global economy and the United States. Particularly on the United States level, environmental laws passed in the large economic market of California will affect production processes for a number of goods sold in other states. California's law puts moral pressure on other states to pass similar greenhouse gas laws while also lowering the economic barriers to doing so. Thus the greenhouse gas law in California is a transformative adaptation on the state level, on the national level (at least in terms of cultural schemas and distribution of resources), and has potentially non-linear effects.

Another example might be a law banning the sale of incandescent light bulbs in favor of more efficient technologies. This law makes a minor change in distribution of resources, but since

most light bulb makers produce non-incandescent light bulbs anyway, the change in distribution cannot be argued to be significant enough to constitute a structural change. While the light bulb law does make a small difference in the problem it is targeting - greenhouse gas emissions from electricity generation - it doesn't change the fuel composition of the electricity generating plants, it doesn't incentivize greater efficiency in the electricity generation process or provide impetus for new electricity-related technologies, nor does in change any balance of power in favor of less pollution in the electricity industry. The light bulb law adapts to the greater awareness of greenhouse gas emissions, but does little to amend the conditions which give rise to those emissions in the first place. It could be argued that a light bulb law affects public conceptions of appropriate electricity use (which would fall under cultural schemas) but there is no research to support the idea that buying CFL or LED light bulbs leads to an overall change in household electricity use. A light bulb law is, fundamentally, an incremental adaptation.

This conceptual distinction, however, only goes so far. In retrospect – particularly in the long term - it is easy to determine whether or not a particular adaptation policy or intervention has made a historical change to social structure. But what is needed in the policy space as human societies struggle to cope with the implications of climate science is ideas that can be readily translated into useful frameworks for policy proposals and analysis. It is not enough to have a descriptive concept of transformational adaptation; the idea is only useful if it can be used by practitioners.

5.3.2 Making transformation practical

The 2007 Bali climate change talks were the first time that adaptation was recognized as a 'building block' of the response to climate change (Ayers & Dodman, 2010). Since then, particularly in the context of more and more climate-related disasters, both scholars and policy-makers have been hard pressed to identify what types of adaptation are more than just a tokenistic reworking of pre-existing policies and priorities to fit within the trendy "resilience" and "adaptation" policy space.

Pelling, O'Brien, and Matyas (2015) do try to take transformation and turn it into a concept that can be operationalized in the sphere of adaptation planning. Invoking David Harvey's "methodology of moments", the authors describe an "adaptation activity space" which includes the interlocking components of individuals, technology, livelihoods, discourse, behavior, institutions, and the environment. Setting aside the fact that the environment is given its own "activity sphere" rather than being recognized as the substratum on which adaptation is theorized and implemented, this conceptual framework is a useful way to describe transformational adaptation to a skeptical audience. In this case, they tested it on staff from a development aid agency in London, but it is easy to imagine this conceptual framework being used to help a skeptical policy-maker or funder understand the social components of adaptation. It is also a useful checklist against which to measure an intervention that purports to be transformational, in that the activity spheres are the socially interacting phenomena which must be changed to achieve long-term, sustainable adaptation to climate change for the majority of people, rather than the few. But it does not provide a platform for differentiating between transformative or

non-transformative adaptation, nor does it offer an opportunity to integrate the idea of transformation with critical theory and other forms of radical scholarship.

The lacuna in this multidimensional conceptual framework is that while it aims to define a socially integrated form of climate change adaptation, and even defines what "socially integrated" might mean, this conceptual framing of the social does not exclude incremental adaptation. If our current working definition of transformation is "goes beyond the incremental" we need to have a definition that can include or exclude, but an adaptive policy might affect one or even several of the activity spheres and still reinforce the power dynamics which undermine resilience and perpetuate vulnerability. The mere fact that an adaptive intervention targets social interaction does not, automatically, challenge the status quo. Thus current scholarship still leaves us with the need to define what the status quo is, so we can also define what does or does not aim to change it. The status quo is, in effect, another way of describing the dominant, or hegemonic, social structure.

Therefore, two steps are necessary to develop a description of transformative adaptation that can be used in a critical or evaluative sense. First, we need to define social structure, so there is a clear conception of what is or is not being changed. Second, this definition needs to be made in such a way that it can provide a rough boundary between these two different types of adaptation, and integrated into the current debate on the social ramifications of climate change.

In effect, I propose a "Sewell test" to distinguish whether a proposed adaptive intervention (or an adaptive measure being considered in retrospect) can be considered transformative, by measuring against these questions:

> 1. Does this adaptation constitute a potentially permanent change to one of the core elements of the dominant social structure: cultural schemas, patterns of resource distribution, and hierarchies of power?
> 2. Is this change significant enough that it is likely to cause an alteration in one or both of the other core elements?

Transformative adaptation provokes a "yes" response to both questions.

5.3.3 Making the Sewell Test Operational

For a better idea of how the Sewell test might work as a diagnostic, in practice, consider that Kates, Travis, and Wilbanks (2012) argue that seawalls could be transformational if they "fundamentally change coastal land uses, such as the community encircling dikes and inlet barriers proposed for the Gulf Coast in the United States" (p7156). In the broadly defined sense of transformation as, effectively, adaptive measures with a significant social component, this is true. But an intervention of this sort would fail the Sewell test, as there is no reasonable presumption that this seawall project would actually alter social *structure*.

The Gulf Coast seawalls are part of a larger suite of proposed responses to the risk of extreme hurricanes along this coastline, such as Hurricane Katrina. Significant, climate-related disasters are a valuable lens through which to view adaptation, because they bring it to the fore within a

larger social disruption with the potential to alter public understanding of rights, responsibilities, and governmentally (Boin et al., 2008a; Brown et al., 2011; Pelling & Manuel-Navarrete, 2011). Recently, climate-related disasters such as the California drought and Hurricane Sandy have given rise to suites of far-reaching and diverse policy approaches to adaptation.

One such approach is embodied in the report issued by the Special Initiative on Rebuilding and Resiliency, sponsored by the Mayor of New York City in the year after Hurricane Sandy inflicted over $20 billion of damage. Since that time, the work of building citywide resilience passed from Mayor Michael Bloomberg to Mayor Bill diBlasio, and since then the resilience initiatives have been integrated into the larger master plan for the city of New York.

The change in the city's leadership has caused a change in the substance of the plan. Where under Bloomberg, post-Sandy resilience was presented as a stand-alone project with an emphasis on physical resilience - an emphasis that was repeatedly criticized when the Mayor's plan was presented to civil society - the diBlasio administration reframes resilience as part of a larger suite of initiatives focused on solving social problems within the city, particularly inequality. This long-standing problem of inequality was significant in both short-term and long-term outcomes from Hurricane Sandy.

The new plans for resilience are characterized by the city government as "Bold, innovative solutions" (3) with the goal of "emerg[ing] stronger from the impacts of climate change and other 21st century threats" (6). But the definition of adaptation within the Master Plan only looks at "physical form or function" (217), even though the "Resilience" section has extensive language about economic resilience through diversifying industry, the challenges that economic inequality poses to recovery and long term resilience, and places community-building at the top of the agenda.

So where does the "One NYC" plan fit within the Sewell Test? The rhetoric emphasizes the social aspects of resilience and challenging the status quo - the two characteristics that have been emphasized in the previously available descriptions of transformation. But the Sewell Test gives a more concrete yardstick. None of the efforts described in the city plan actually target cultural schemas, distribution of resources, or hierarchies of power. While the rhetoric seems to target these characteristics, a look at the indicators demonstrates clearly that resilience-building still operates within the current social structure.

Moreover, I would argue that looking at the city's actions through the lens of social structure shows that the city's actions reinforced the existing social structure. If you look at, for example, how federal money has been spent on adaptation and resilience building, seven times as much money is being spent on rebuilding one and two family homes in the inundation zone than on rebuilding and climate-proofing public housing. "Greatest need" is actually defined as reimbursing homeowners for storm losses, not improving infrastructure, public education about climate hazards, or providing assistance to the poorest residents, renters and people in public housing.

5.3.4 Challenges of transformation and a norms–neutral test

The Sewell Test provides us with a framework for identifying transformational adaptation and interrogating gaps between the rhetoric of social transformation and the actual policy realities of how adaptation plays out on the ground. It incorporates materiality, discourse, and power to describe the hegemonic social structure which transformative adaptation is supposed to challenge.

The Sewell test lacks a normative framework - it only asks if the change has happened, but it does not ask whether the change is good or bad. From the perspective of epistemic rigor - particularly in the context of an academy which is still struggling over how norms, research, and politics interact - I see this as a positive aspect. The delineation is clear and once a researcher can determine how an adaptive intervention falls in terms of structural change, a separate category can be determined for whether the consequences of that adaptation support the goal of social justice.

The problem with resilience is that it can be used to mean anything, as either an organizing principle for maintaining a neoliberal status quo or for pushing for a form of resilience that fundamentally changes the social relations of society. Theorizing transformation in a robust way steps aside from the conversation about resilience and moves it toward the conversation about how society makes resilience happen. It provides a vocabulary to describe whose interests are being served by different policies, and what types of changes are being advocated for.

Transformation is not just challenging to the status quo, it threatens social stability. How to enact transformative policies without engendering maladaptive backlash – or how to even advocate for transformation in a way that is less threatening to the many people who already live marginalized and unstable lives – is no small question. Similarly, because this definition is itself norms-neutral, there needs to be additional theoretical work to distinguish between transformative interventions within larger normative frameworks. My current research offers no easy way to resolve these sticky problems, which should be the subject of future work for myself and many others.

While adaptive capacity can be built up with a top-down approach, it is also clear that in a crisis resilience also depends on horizontal governance approaches and is inhibited by centralized control (Homeland Security Studies and Analysis Institute 2013a). Other forms of adaptive capacity building include workshops to increase public understanding of threats and then follow up to maintain public awareness, the upgrading of infrastructure and other public goods, and the deployment of market-based signals such as through insurance programs.

Another approach to incorporate social factors into adaptation action is to expand common conceptualizations of resilience and vulnerability to include a wide range of sociocultural factors including power, access, and social difference. Schmeltz et al (2013), analyzing the community response to Hurricane Sandy in the Red Hook Houses public housing complex, note the need for public health vulnerability assessments which define vulnerability much more broadly than the current standard, to include issues such as mental health, marginalization, a more nuanced

assessment of public transportation access, gentrification, and the role of social networks. Indeed, widening our definitions of what both vulnerability and resilience are may be critical to the goal of including marginalized perspectives into the climate adaptation process (Bottrell 2009).

Human society is part of a larger socio-ecological system that is in a state of rapid change in response to external pressures. Nonetheless socio-ecological systems are always in a state of dynamic change in response to internal and external stimuli. In such a system adaptability and transformability – *adaptive capacity* – are prerequisites for resilience. The question of resilience, then, is in the eye of the beholder – the question of which elements in a given system need to be maintained, and which elements could or should be rejected to maintain the integrity and functions of the whole. Without *some* disturbance, a system will not be encouraged to adapt and reorganize to function more effectively and resiliently. Without adversity, systems cannot improve.

Epigraphs

"We have been providing food at an average of one hundred families per day. And we do give on a weekend, you know like, on a Saturday easily we could give two hundred and fifty, three hundred boxes of food to the people." (Edward Malave)

"The most amazing thing that has happened from the storm, was the grassroots type of organization of people supporting people. The days that followed, you know, people within the block started to organize and have volunteers who dropped off food, dropped off clothing, bedding, anything that was needed, so, we actually, just the grassroots area is where it was just incredible, people just putting other, neighbors supporting neighbors." (Interviewee #5)

"I hope two things come out of this. One being a real kind of like community self determination movement in affected areas and the other is I hope that it could maybe solidify some kind of movement to change the way we do disaster relief because it's – it's almost not meant to work well. And that has a lot of impact on a lot of people and if we are seeing more natural disasters, I think it's time to think about doing it a different way and maybe putting more of the power over what to do in the hands of community members." (Interview #12)

Appendix: List of Interviewees

All interviews quoted here are fully available at the website for Superstorm Research Lab, www.superstormresearchlab.org. There you can also find all of the raw data I used for this dissertation, including dozens of additional interviews and public reports.

Named interviewees:
- Nathan Klein and Dylana Dillon, volunteers with Occupy Sandy in New Jersey
- Edward Malave, pastor of New Church International, Coney Island (Brooklyn)
- Carols Menchaca, previously liaison to City Council Speaker Christine Quinn, now a member of the New York City Council

Anonymous interviewees
- Interviewee #1: Adult male Rockaways resident
- Interviewee #3: Woman in her 30s, resident of Coxsackie New York, 30s
- Interviewee #2: Woman in her 70s, resident of Coney Island (Brooklyn)
- Interviewee #4: Elderly woman, resident of Coney Island – through Russian translator
- Interviewee #5: Woman in her 50s, Staten Island
- Interviewee #6, Woman in her 30s from Coney Island
- Interview #7: four males, teens and 20s, residents of Far Rockaway.
- Interview #8: Woman in her 40s, resident of Rockaway Park
- Interview #9: Senior member of the city administration
- Interview #10: A staff member at the Office of Emergency Management
- Interview #11: a woman in her mid-20s who volunteered with Occupy Sandy in Sheepshead Bay
- Interview #12: a woman in her 30s who volunteered to help with mold remediation
- Interview #13: member of the city administration involved in housing recovery
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