RURAL OKLAHOMA AND THE NEXUS OF DISASTER VULNERABILITY, RISK, AND RESILIENCE

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Abstract: The concepts of vulnerability, risk, and resilience have experienced a meteoric rise in academic attention among disaster scholars over the past three decades. Vulnerability operates as the set of social conditions which predispose certain populations or social spaces to inequitable environmental burdens precipitated by disaster. The prolific study of risk has led to a robust set of literatures which tell us how people in a variety of contexts perceive and understand risks associated with natural hazards. Research focusing on disaster resilience elucidate the qualities and behaviors which allow social individuals, groups, and systems to cope and adapt to disaster. While these studies have furthered our collective understanding of what factors contribute to adverse outcomes, or allow certain groups to successfully navigate the dangers of environmental hazards, few have focused on how these concepts operate prior to disasters. Moreover, most disaster research has privileged urban areas. Given our current understanding of climate change, rural areas in the Midwest are positioned to experience some of the most severe socio-economic outcomes. Adapting the Community Capitals Framework to a disaster context, this dissertation uses qualitative methodology to analyze 56 semi-structured, in-depth interviews drawn from two distinct rural areas of Oklahoma to explore the nexus of vulnerability, risk, and resilience. Broadly, a deteriorating, reciprocal, and mutually reinforcing relationship between rural spaces and urban areas have led to a cognitive and geographic rural-urban divide. A combination of politically conservative economic policy, a systematic divestment from social welfare programs, and a combination of rural stoicism and cultural stigma creates, maintains, and exacerbates a condition called community disenfranchisement. Rural communities experience feelings of abandonment and neglect and direct that animosity toward urban areas and government agencies. Perceptions of isolation lead to rural insulation as distal communities seal themselves off from larger institutions. Despite this deleterious relationship, rural communities turn to one another, forging constellations of bonding social capital to stitch together what few resources they do have to cultivate resilience. The current study also offers important implications and best practices for cultivating resilience in rural spaces while demonstrating a need for improving social relations across the rural/urban divide.

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CHAPTER I

INTRODUCTION

The conceptual intersection between vulnerability, risk, and resilience to natural hazards and disasters has become a burgeoning and intensive area of inquiry for disaster scholarship in the past two decades. The combination of historical, physical, and social dynamics including an increasing human population, global development, and ecological changes brought on by the growing specter of climate change, have caused society to question the stability of our social world and beg critical questions about the ways in which humankind will navigate and manage the challenges presented by a rapidly changing natural world. Recent catastrophes such as Hurricane Katrina that struck New Orleans in 2005; the 2011 Tohoku earthquake and tsunami which triggered a nuclear disaster at Fukushima Daiichi Nuclear Power Plant in Japan; Hurricanes Harvey, Irma, and Maria in 2017; the growing frequency and severity of wildfires in the western United States; and the COVID-19 pandemic highlight the need for this type of research, making the multidisciplinary work of disaster scholars more crucial than ever.

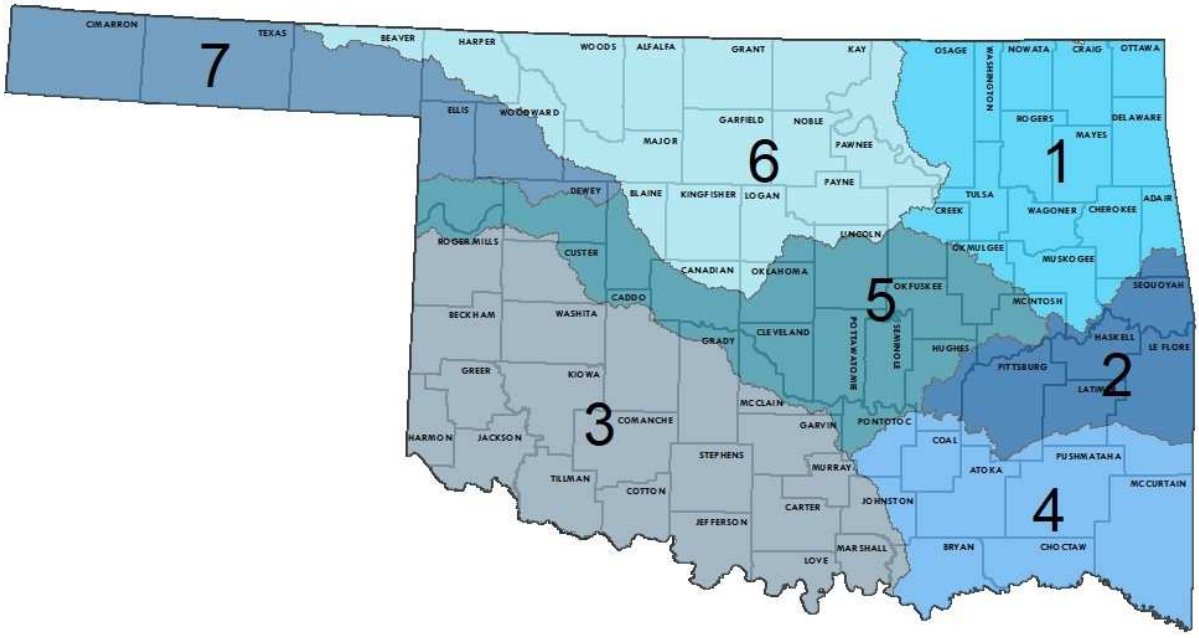
Contemporary disaster research focuses on how vulnerability, risk, and resilience are (re)produced through social processes and decision-making which shapes individual, group, community, and societal outcomes. However, classic disaster scholarship in the United States centered its research on urban centers to glean perspective on how large populations would respond to a crisis (Perry 2018; Quarantelli 1988). Studies of rural communities were largely conducted in an international context focused in developing countries (Wisner et al. 2004). Additionally, research on community preparedness for hazard events is relatively understudied in favor of a scholarly focus on disaster response and recovery (Meyer 2018). Rural communities plan for, respond to, recover from, and experience disaster in very different ways when compared to urban spaces (Cutter et al. 2014, 2016). Rural communities are also often conceptualized as homogenous, ignoring the diverse historical, cultural, ecological, and social characteristics of these spaces. These spaces also stand to suffer some of the most adverse effects in this novel era of anthropogenic climate change (Shafer et al. 2014).

Rural Oklahoma provides a prime opportunity to contribute to disaster scholarship dedicated to assisting these populations develop capacities for resilience to natural and technological hazards. The southern high plains of the United States are exposed to a wide array of acute and chronic natural hazards: wildfires, hail, earthquakes, tornados, tropical storms, severe thunderstorms, winter storms, floods, and drought. Two regions serve as the focus of this research: the Washita watershed in southwestern Oklahoma and the Kiamichi watershed in the southeastern part of the state. While both regions are considered rural, they are ecologically very diverse. Washita is relatively flat and dry. The land in the Washita watershed is dominated by agricultural production and is mainly composed of farmland and cattle ranches. In contrast, the Kiamichi sits at the foothills of the Ozarks and receives much more rainfall per year. A large portion of the Kiamichi watershed is state parkland where tourism is a large economic contributor. The comparison of these two regions (see "Water

Basin 3" and "Water Basins 2 and 4" respectively in Figure 1) provides compelling perspectives on how rural communities plan for, respond to, and cope with the effects of natural hazards yet are diverse enough to show parsimony in rural emergency management and preparedness strategies.

FIGURE 1. WATER BASIN MAP OF OKLAHOMA

(Department of Environmental Quality 2022)



To address factors that contribute to the production of vulnerability, risk, and resilience in rural Oklahoma this dissertation addresses the following research questions: (1) *Referencing the Community Capitals Framework (Flora and Flora 2008), what factors are associated with vulnerability, risk, and resilience to environmental hazards in rural Oklahoma?* (2) *How do rural Oklahomans perceive risk individually, in their communities, and in their region more broadly? How do these perceptions differ across Washita and Kiamichi regions?* (3) *In light of these first two research questions, how do communities in rural Oklahoma plan and prepare for, as well as mitigate the risk of exposure to environmental hazards?*

To answer these questions, I employ a qualitative methodological approach with descriptive quantitative data providing background context and knowledge about the Washita and Kiamichi regions and their populations. Utilizing a combination of quantitative data from Oklahoma Meso-Scale Integrated Socio-Geographic Network (MSISNET) household surveys collected quarterly from 2016-2018, the 2010 U.S. Census, and Oklahoma Department of Commerce, I examine macro-level dynamics related to demographic composition of the Washita and Kiamichi watersheds. These data sources also provide broad economic information as well as risk perceptions regarding increasing severity and frequency of natural hazards. The quantitative, descriptive analysis provides broad context for a detailed analysis of the nuanced preparedness strategies found in 56 semi-structured in-depth interviews conducted from 2016-2018 as part of the Oklahoma Established Program to Stimulate Competitive Research (EPSCoR) project.

This dissertation examines the trajectory of classic and contemporary disaster research relevant to definitions of disaster and concepts of vulnerability, risk, and resilience. Next, I introduce the Community Capitals Framework (CCF), a comprehensive, intuitive, and pragmatic theoretical orientation which integrates a wide variety of resources or capitals that rural communities rely on to build economic security and sustainability (Flora and Bregendahl 2012). This dissertation extends the analytic and practical utility of this framework by conducting a comprehensive empirical application of the CCF in the context of disaster preparedness. The methods chapter provides greater detail on the types and sources of data that provide the empirical basis for this study, how key concepts are conceptualized and measured, and how they are synthesized in a strategic and coherent manner. The intent of this research is not just to contribute to current trends in disaster research examining the intersection of vulnerability, risk, and resilience in rural communities, but also to develop an intuitive methodological practice for utilizing the CCF in a way that allows emergency management and community decision makers to plan and coordinate more deliberately within their community.

Additionally, this project seeks to be an inventory of best practices to share across communities. Through collaboration and communication, rural communities can increase their potential to navigate the specific challenges posed by exposure to environmental hazards in Oklahoma and elsewhere.

CHAPTER II

REVIEW OF LITERATURE

2.1 The Field of Disaster Research

Arguably, the first published scholarship specifically focused on disaster outcomes was Samuel Prince's work on the explosion of a French munitions ship in Halifax, Nova Scotia, Canada in 1917. The result of this research was *Catastrophe and Social Change* (1920) which detailed the ways in which the surrounding community responded to and managed a disaster which claimed 1963 lives and injured approximately 9000, accounting for nearly a quarter of the city's population (Anderson 1978; Scanlon 1988). *Catastrophe* not only became relevant to the study of this particular disaster in Canada but, after the conclusion of the Second World War, quickly became a novel example of how scientific inquiry can (by proxy) assess the ways in which society might respond to nuclear attack. The onset of the Cold War emphasized the need for more studies of this kind in the late 1940s and lead to the organizational and institutional development of the discipline of disaster research. The main objective of early disaster research was to study events that could serve as a proxy to answer questions related to individual, group, community, and organization response to

a potentially catastrophic and sudden military attack in the developing nuclear age (Ikle 1951; Quarantelli 1988). These findings would serve as an empirical basis for national security planning in an era plagued by the uncertain and ever-present threat of nuclear war (Clarke 1999). Conventional opinion suggested that the public would respond poorly to such an event. In Hobbesian fashion, most thought that panic, looting, civil unrest, and violence would take hold of the affected region when confronted with the comprehensive social disruption and extreme stress caused by a disaster (Kroll-Smith 2018; Quarantelli 1995). Pioneering disaster research in the 1950s and 1960s by the National Opinion Research Center (NORC) at the University of Chicago resulted in more than 160 studies of community response to disaster. Overall findings of this research disproved widely held beliefs about collective human behavior following a disaster event. Although studies found adverse effects from disasters such as loss of life and property, the collective behavior of the public was generally positive. Not only were social discord and violence rare, but most individuals, groups, and communities engaged in prosocial behavior—creating support networks and providing aid to people and places effected by disaster (Quarantelli 1988). This research also introduced a more nuanced understanding of the complex psychosocial issues that affected individuals and communities after a disaster, beyond the physical destruction and financial fallout (Quarantelli 1985).

Building on the body of knowledge generated by these early studies, research in the 1970s began to focus specifically on the alteration of disaster communication and decision-making processes when faced with extreme stress (Drabek and Haas 1969). In addition to research on social behaviors during and immediately following a disaster event, studies of long-term disaster recovery started to gain scholarly attention. Scholars

focused on the ways in which communities reestablish the functionality of social systems following a disaster (Dynes and Drabek 1994). However, systemic, macro-level perspectives were limited in their ability to provide detailed descriptions of micro-level processes that contributed to recovery at larger scales (Tierney 2019). Qualitative methodology—specifically in-depth interviews and inductive field studies—provided opportunities to better understand how micro level behaviors and decision-making processes aggregated into community level and societal recovery (Perry 2018). Such detailed analyses quickly highlighted divergent and variegated ways in which long-term recovery manifested for different households and communities impacted by disaster events.

Disaster research has long demonstrated that disasters are not just physical events but are primarily and inherently social (Kroll-Smith and Couch 1991; Quarantelli 1985, 1987). Disasters claim lives, cause property and economic losses, disrupt social systems, change social relationships, create trauma, and alter both physical and mental landscapes. However, while disasters strike indiscriminately, their effects are felt differentially by individuals, groups, and communities (Blaikie et al. 1994; Tierney 2014; Wisner et al. 2004). Research in the 1980s and 1990s demonstrated the ways in which various social factors contributed to how individuals and collectivities experience stress and adverse outcomes related to disasters (Quarantelli 1988). In other words, the effects of disasters are experienced differently according to geography and social group (Cutter 1996; Cutter et al. 2008; Cutter et al. 2014). "Vulnerability" was widely adopted as a crucial concept for explaining the unequal distribution of a disaster's effects. The twenty-first century has built on the discipline's fascination with the concept of vulnerability and expanded

focus to include its complement—"resilience." While vulnerability is associated with factors that contribute to negative societal outcomes and environmental burdens following a disaster, resilience describes the capacity of an individual or group's ability to anticipate, absorb, and adapt to post-disaster impacts (Norris et al. 2008). Resilience is also associated with social factors that make one more or less likely to recover after a disaster. Both vulnerability and resilience will be discussed in more detail later in this chapter.

Clearly, disaster research is complex and multi-faceted. This complexity is mirrored in the institutionalization of the discipline. No less than 16 different disaster research programs (and at least as many academic journals dedicated specifically to the study of disasters) can be found all over the globe (Tierney 2019). Dimensions of space and time, social and economic systems, as well as physical and mental structures make disaster research a multidisciplinary field. Disciplines of meteorology, seismology, geology, geography, sociology, political science, economics, engineering, communications, and psychology have all contributed to the development of the field (Dynes and Drabek 1994). Each discipline provides unique theoretical and methodological perspectives from which disaster scholarship, writ-large, can glean important information on the ways in which disasters occur and shape individual and collective outcomes. Furthermore, disaster scholarship's concentration on concepts of vulnerability and resilience in the past 30 years have situated disaster research squarely in the realm of social inequality and social justice (Wisner et al. 2004). The following section discusses concepts central to this study: hazard agents, disasters, vulnerability, risk, and resilience.

2.2 Key Concepts

The term "disaster" invites a variety of evocations that shape individual behaviors and collective decision making. First, it is crucial to dispense with many commonsense applications and perceptions of what a disaster is. Mentioning "disaster" often conjures images of natural phenomena such as hurricanes, tornados, tsunamis, and earthquakes. This also includes anthropogenic situations involving terrorism, oil spills, chemical explosions, or nuclear contamination. Places or dates also are associated with disaster: San Francisco in 1905; Chernobyl, 1986; New York City and Washington, D.C. on September 11th, 2001; New Orleans, 2005; Okuma, Fukishima, Japan, 2011. These conventional yet imprecise notions of what a disaster is are key to its basic definition.

2.2.1 Hazard agents

Environmental phenomena commonly conflated with disasters are more precisely known as natural or environmental hazards. A natural/environmental hazard is defined as "a natural process that could *potentially* threaten the things that people value (Gregg and Houghton 2006:21)." Potential is key to distinguishing a hazard agent from a disaster. Tornados in the midwestern United States often occur in areas where no people are directly affected. Hurricanes sometimes travel into the central Atlantic without ever making landfall. Potentially destructive "hazard agents" vary in predictability, probability, and controllability—these issues will be broached in a later section on risk (Fritz 1961). Precipitating agents also vary in their etiology (natural or anthropogenic); speed of onset and duration (acute such as a tornado or protracted as in the case of drought and oil spill); their scope (focused or diffuse); and in their unique destructive capacities (Fritz 1961; Perry 2018). The requirement of a meaningful geographic *place*—spaces in which people live, operate, and hold to have intrinsic and formulated meaning

and value—is a critical criterion for a general definition of disaster as these natural processes threaten and interact with things people value.

2.2.2 Disaster

The concept of disaster has evolved over time. Initially, it is critical to situate a meaningful definition of disaster that is intentionally divorced and distinct from discussion of a disaster's causes, conditions, and consequences (Quarantelli 1989, 1995, 2005; Stallings 2005). While crucial to the theoretical development of the field, the concrete conceptualization of a concise and bounded definition of disaster is of import here (Perry 2018).

As discussed in the background on the field of disaster research, the evolutionary treatment of this concept has determined the focus of researchers and their lines of inquiry. The earliest and perhaps most cited definition of the term "disaster" was offered by Charles Fritz (1961):

> …an event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society, undergoes severe danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented (p. 655).

Fritz's definition carries several key assumptions. The first is scalar. This definition of disaster centers exclusively on society and its subdivisions, focusing on broad, large scale effects of disaster. Here, "disasters" affect self-sufficient systems of society, rather than their individual or constituent parts. This is problematic as individual- or household-level disturbances or damages are necessarily excluded from disasters and are relegated to "accidents." Next, disaster as defined in this context focuses on biological or physically tangible outcomes. Damages to persons or infrastructure serve as the sole criteria for qualification and are directly implicated as the causal agents of disruptions to abstract social structures, relations, routines, and functions of society. Notably, psychological

trauma, disruptions to relationships, or fissures in the social fabric of society are not considered (Erikson 1976, 1995; Kroll-Smith and Couch 1991). Third, this definition of disaster implies order, purpose, and meaning to society. From this perspective, the occurrence of a disaster alters some or all normative functions in society by disruption and destruction. Last is a temporal consideration. Fritz's (1961) definition explicitly states that disasters are "concentrated in time." Bounding disaster to a specific time frame suggests that at some point following a disaster, the disorganization and disruption will be overcome or repaired. Other more contemporary phenomena, such as climate change, have introduced a new order to the frequency and severity of hazard agents making their occurrence normative and prolonged rather than anomalous, sporadic, or unprecedented (Cutter 2020).

More recent research has criticized Fritz's view (Kroll-Smith and Couch 1991; Perry 2018; Tierney 2014; Wisner et al. 2004). Disasters cannot be effectively disentangled from social conditions prior to the hazard event nor separated from the specific outcomes following their impact. Defining disasters so narrowly ignores their potential to cause irreparable "invisible" harm to social structures, systems, communities, groups, and individuals (Vyner 1988). Erikson's (1976) work in Buffalo Creek, WV demonstrated how the coal ash spill in that community rendered a "blow to the psyche that breaks through one's defenses so suddenly and with such brutal force that one cannot react to it effectively" (153). Individual trauma is well documented following disasters including economic (Deryugina, Kawano, and Levitt 2018; Pelling and Ozerdem 2002; Rodriguez-Diaz 2018; Rose 2007; Tierney 2007), psychological (Erikson 1976, 1995), and psychosocial effects (Gill 2007; Gill, Picou, and Ritchie 2012, 2014; Gill, Ritchie,

and Picou 2016; Ritchie 2004; Rodriguez-Diaz 2018). Key to understanding these outcomes is knowledge of how (or if) communities prepare for these hazard agents before they occur.

While pre-disaster planning and preparedness are crucial factors to navigating hazard threats, decision-making and policy in disaster response and recovery following a hazard event also contribute to negative outcomes. Severing community ties isolates individuals from support networks, initiating what scholars call a secondary trauma: "…a blow to the social fabric of a community caused by inadequate responses to an initial hazard event and/or inadequate responses to secondary hazards" (Gill 2007:625). In Buffalo Creek, Erikson found collective trauma to be distinct from individual effects. Here he considers the two "'I' continue[s] to exist, though damaged and maybe even permanently changed. 'You' continue[s] to exist, though distant and hard to relate to. But 'we' no longer exist[s] as a connected pair or as linked cells in a large communal body" (p. 154). Ritchie's (2004) study with the people of Cordova, AK following the *Exxon Valdez* oil spill found similar collective trauma. One of the defining characteristics of her study focused on how the incredibly protracted legal process people in "renewable resource communities" engaged with for financial compensation was in some ways more traumatic than the oil spill itself (Dyer et al. 1992; Picou et al. 1992; see also Ritchie and Long 2021). In many ways, the oil spill has irreparably reshaped the culture and way of life for communities in the Prince William Sound. These findings illustrate how human decisions made after a hazard event can actually create entirely new traumas for individuals and communities.

These studies and others highlight the psychosocial costs of disasters rather than focusing exclusively on material or economic loss (Edelstein [1988] 2003). The threat, and more precisely the perception of the threat, of environmental contamination leaves psychological scars that reshape the way one may view their world. As Erikson (1995) wrote in regard to the Three Mile Island crisis: "'well why don't you move to a safer location?' They asked. But that is to misunderstand, for there is no safer location. The point is not that the particular region is now spoiled but that the whole world has been revealed as a place of danger and numbing uncertainty" (156). Part of socialization includes the formation of primary cognitive structures that make meaning from spatial relations in particular geographies. A lack of change in place-based meaning systems gives individuals a sense of safety and security which reinforces self-identity (Proshansky et al. 1983). Perceived or objective changes to the surrounding ecology can cause ontological insecurity and changes to "lifescape." Alterations to this relationship between an individual and their environment can fundamentally challenge notions of individual or community identity. The result is psychosocial trauma, feelings of loss, and insecurity (Cox and Perry 2011; Edelstein [1988] 2003; Gill et al. 2016).

The contestation between disaster scholars which adhered to the event/hazard centered approach and those that who leaned more in the direction of the social constructivist approach found common ground in 1991. In a pivotal article, Kroll-Smith and Couch (1991) critiqued the singular focus of each, reconciling them within a new ecological-symbolic theory. The authors hold that the event/hazard approach excels in centering on the particular ways in which a typographical treatment of environmental hazards is useful in characterizing the unique biophysical effects on the physical,

biological, and built environments of communities (Couch and Kroll-Smith 1985). However, this paradigm falls short by inadequately accounting for the social, psychological, and cultural factors that shape the interpretation of those outcomes for both individuals and communities. In contrast, social constructivists thrive in the contextual definitions and meanings attached to the outcomes of disaster. However, they fail to consider the unique properties that quantitatively and qualitatively different environmental hazards have in shaping experiences which are ultimately situated in the physical environment. Here, Kroll-Smith and Couch (1991) propose a compromise:

> …The real issue is not the quality of the disaster agent per se, but whether or not it significantly alters the relationship between a community, its built, modified or biophysical environments, and how people interpret and experience the changes in those environments (361).

In other words, the ecological-symbolic approach accounts for the unique ways in which different environmental hazards, natural or technological, affect the physical environment as well as the particular contingencies of cultural and social dimensions that shape the perceptions and experiences of those individuals and communities confronted with environmental changes. Combining these two competing paradigms in this way views the relationship between humans and their landscape not separate and additive but reciprocal and mutually reinforcing. The ecologic-symbolic approach relates the embodied connection of humans and their communities to the physical environment with the social factors that structure their understanding of that relationship. It is this perspective that is adopted here.

2.2.3 Disaster as a process

Implicit throughout the dynamic evolution of disaster scholarship is a gravitation toward the idea that disaster is a process rather than a singular event (Nigg 1995). To articulate this, Baker and Chapman (1962) constructed an objective linear progression of sequential stages through which those who endure the effects of disaster must proceed. Stages of a disaster begin prior to its onset where society is in somewhat of a stasis, operating in normal, routinized fashion. As an environmental hazard is identified and approaches, communities enter warning and threat stages. The arrival of the event signifies "impact." The "inventory" stage is marked by an evaluation of the fallout before moving to secure life and property in the "rescue" stage. "Remedy" involves stabilizing the current situation. Finally, "recovery" and "rehabilitation" stages reestablish normal patterns of social behavior and seek to make people and communities whole again.

Baker and Chapman's (1962) approach represented a substantive step toward attempting to create a systematic method for measuring a set of mutually exclusive categories to capture the linear, temporal development of any disaster as a processual social phenomenon. The emergence of research on technological disasters in the latter part of the twentieth century problematized the linear assumptions of this stage approach (Edelstein [1988] 2003; Gill and Picou 1998). The invisible nature of the effects of technological hazards redefined the ways in which people experienced disaster:

> Radiation and most other toxic substances are without body. One cannot taste, touch them, smell them, or see them, and for that reason they seem especially ghostlike and terrifying. Moreover, they invert the process by which disasters normally do harm. They do not charge in from outside and batter like a gust of wind or a wall of water. They slink in without warning, do no immediate damage so far as one can tell, and then begin

> their deadly work from within—the very embodiment of stealth and treachery (Erikson 1995:150).

For communities enduring a technological disaster, the linear progression tends not to apply. Individuals and communities are caught in a seemingly endless loop of warning, threat, and impact as communities struggle to come to a consensus about the long-term effects of contamination (Gill and Picou 1998).

Just as conceptualizing disaster in distinct stages is helpful for understanding the process of disaster in a systematic and methodologically rigorous way, understanding societal responses gives insight into organizational and institutional dynamics. The Emergency Management Cycle provides such an inventory (Drabek 1986). Separated into four distinct phases—preparedness, response, recovery, and mitigation—the cycle provides an intuitive framework for understanding how communities behave before, during, and after disasters. Preparedness entails planning prior to an event including things like early detection and warning systems, planned evacuation routes, emergency personnel training, and reinforcement of the built infrastructure. Response involves the coordination and deployment of emergency personnel and resources in order to reestablish safety and security. Rebuilding people's lives and property is sought during recovery. Finally, in this model, mitigation takes lessons learned from the experience and unforeseen developments of a disaster to inform decision-makers and ensure communities are better prepared for the future (Meyer 2018).

Clearly, disasters are the culmination of a complex, diverse, and dynamic set of social and biophysical phenomena that have and will continue to shape the lived experience of human society across the globe. Not confined to a particular historical moment at the boundary of a collision between an environmental hazard and society,

disasters must be conceptualized as a process. The next section focuses on the role of social dynamics as a major influencer that shapes how this process unfolds.

2.2.4 Vulnerability

Research illuminating dimensions of social harms that contribute to the adverse outcomes of disasters led researchers' theoretical perspectives to center on social dimensions that shape differential outcomes of disasters. Specifically, social vulnerabilities are defined as "*the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard*" (original emphasis) (Wisner et al. 2004:11). Returning to Fritz's definition, theoretically, the term "disruption" carried specific assumptions and implications that shaped the trajectory and development of disasters as a subject of study. Paramount among them is the premise that the hazard agent was the principal and sole etiological cause for societal disorganization after a disaster event. An essentially functionalist orientation, early disaster research suggests that disruptions were caused specifically by hazards. Furthermore, it presumes that society was functioning properly prior to their onset. Early vulnerability research followed this logic, focusing on the vulnerability of critical infrastructure and the damage caused to property and the physical environment (Mileti 1999). However, as stated earlier, vulnerability to environmental hazards implies the potential for loss (Cutter, Boruff, and Shirley 2003). Lines of inquiry which focused on the experiences of specific populations following a disaster noticed a distinct pattern in those realities—namely that social factors that existed prior to the onset of the disaster predisposed certain populations to greater negative outcomes after they

occurred (Wisner et al. 1994). In other words, while the hazard agent was the catalyst for negative experiences in communities affected by disaster, the causal mechanism was socially constructed and embedded into the otherwise normal routinized social processes of everyday life (O'Keefe et al. 1976; Quarantelli 1995; Smith 2006; Tierney 2014).

The emergence of *social* vulnerability as a key concept marked a turning point in the transition of disaster science away from a scientific ethos of functionalism that focused on biophysical mechanisms as chief causal agents in the negative outcomes following disaster and toward a paradigm centered on a society in perpetual conflict fueled by human factors of inequality embedded in the social fabric itself (Perry 2018; Tierney 2014). "Indeed, disasters are the products of the social, political, and economic environment, as well as the natural events that cause them" (Fothergill and Peek 2004:89). More specifically, disasters are the historical product of interactions between our ecological relationship with the physical landscape and social factors which include economic interests (Kroll-Smith 2018); cultural ethos (Erikson 1976); racial animus (Bolin and Kurtz 2018; Elliot and Pais 2006); inefficient and ineffective governance (Beck 1997; Ritchie, Gill, and Farnham 2013; Straub 2020); knowledge production and communication (Beck 1992); and geographic location (Cutter 2003; Cutter et al. 2003). For Lavell and Maskrey (2014) "Disasters are manifestations of *unresolved development problems* and outcome-based indicators of skewed, unsustainable development processes" (p. 272, italics in original). In this way, adverse experiences associated with disasters are the product of structured inequalities and social vulnerability. These factors contribute to a social tension that builds over years and generations that only requires an external event to trigger these mechanisms and unleash their destructive potential on an

unsuspecting people. Place serves a crucial function in building capacities for vulnerability as individuals and communities grapple with the psychological, social, and emotional effects wrought by a disaster's alteration to the symbolic and material landscape (Cox and Perry 2011; Edelstein [1988] 2003).

To this point, vulnerability has been conceptualized as a set of conditions that predispose specific populations to differential effects of a disaster *prior* to their occurrence. Missing from this conceptualization is how social vulnerability functions in the temporal period *following* the impact of an environmental hazard. Vulnerability also plays a key role in the recovery phase of disaster. How society responds to communities affected by disaster and helps to facilitate the recovery of communities is often predicated on social conditions and vulnerabilities as well (Tierney 2014). The situation in New Orleans following Hurricane Katrina in 2005 serves as a quintessential example of this dynamic. Not only were non-white people of lower socioeconomic status more predisposed to greater harms as a result of the hurricane, lack of resources for these same populations meant their recovery efforts carried additional challenges.

To illustrate this point, *Recovering Inequality* (Kroll-Smith 2018) details how race and class shaped the inequitable distribution of housing relief for survivors of Hurricane Katrina. For example, a large portion of the population could not verify their ownership of property. This was due to the oral or informal transfer of property that was a common cultural practice in and around New Orleans. Property, that in some cases, had been owned for generations. However, these "informal" property rights were not accepted by authorities distributing housing relief. Property owners had difficulty providing proper documentation to validate their ownership and qualify for housing assistance, making

them ineligible for aid. Even if families did have these documents, many were lost in the storm surge, flooding, and damage that followed the storm. Official documentation (i.e., deeds, property tax reports, mortgage records, etc.) is the exclusive means by which Federal Emergency Management Administration (FEMA) attributes eligibility, and thus financial relief, to applicants (Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988). Additionally, in the wake of the disaster, public housing was condemned and sold to private interests for redevelopment, leaving New Orleans with approximately 3,000 fewer public housing units than before the storm. Ultimately, these institutionalized processes demonstrate what Kroll-Smith (2018) also uncovered in his study of the San Francisco earthquake of 1906: "The keen interest among San Francisco's propertied class was a timely return to 'modern business conditions'" (96). In other words, institutionally-governed recovery processes privilege economic interests at the expense of human ones and vulnerability figures as the crucial fulcrum on which the axis of these priorities tilt.

2.2.5 Risk

Vulnerability science accomplished the difficult task of identifying and conceptualizing the social and biophysical dimensions of the potential for loss following a disaster. Risk provides a framework for understanding the subjective and objective probability for experiencing that potential loss. Risk relates to vulnerability by illuminating the intersection between built and social vulnerabilities with the probability that a hazard will impact a community (Blaikie et al. 1994).

To model this relationship, Wisner and colleagues (2004) introduced a Pressure and Release Model. The core argument of the pressure and release model is that adverse outcomes precipitated by a natural hazard can be attributed to the degree of social vulnerability that is present along three key dimensions: root causes, dynamic pressures, and unsafe conditions. "Root causes" include macro level paradigms and processes that shape how society operates. This includes access to power structures, resources, and the design of ideological systems which enable the function of the political economy. These root causes are situated at a foundational level in this framework. "Dynamic pressures" articulate "root causes" through the specific set of conditions manifested by meso-level organizational structures, governance, and culture in a given area. These include the development or lack of urbanization, free communication, funding for social safety programs, economic health (including a diverse and solvent economy), and training and skills. As a mediator between root causes and dynamic pressures are the unique characteristics and destructive potential of hazard agents endemic to those spaces. "Root causes" are channeled through "dynamic pressures" to situate localized conditions and ground risk in a temporal and spatial context (Wisner et al. 2004). "Unsafe conditions" form the final analytic component of the Pressure and Release Model. Unsafe conditions augment this grounded perspective by accounting for localized disaster planning. Preparedness, infrastructure development specific to hazard mitigation, level of institutional support, and individualized economic wealth shape outcomes at a micro-level.

Societal recognition and apprehension of risk involves estimating the likelihood and probability of exposure to hazards. The groundbreaking work of Ulrich Beck (1992)

examined the ways in which society perceives, manages, and mitigates risks. Beck's *Risk Society* conceptualizes risk as the fundamental social issue in society. As human civilization industrialized, the latent effects of these technologies created anthropogenic risks in the form of pollution, environmental degradation, nuclear decay, and the alteration of our very climate (Beck 2009). Concerned mainly with technological hazards as an unintended but accepted biproduct of industrial development, hazards were no longer localized phenomena but a global problem. The management of these nascent risks fell to social institutions designed to preserve the safety and security of society. The public relies on these institutions and experts to navigate and negotiate risk on their behalf.

However, risks are not simply objective phenomena in a known world. Risks are, by nature, unpredictable and to some degree unknowable. Experts and institutions use a rational, probabilistic calculus to estimate the likelihood of their occurrence, the intensity of impact, and invest in preparedness and recovery apparatuses appropriate for those cost/benefit calculations (Beck 1992). Inevitably, the variation in intensity and the unpredictability of hazards that fall outside of probabilistic risk assessment create a situation where institutional safeguards become overwhelmed and inadequate to either prepare for or manage the outcomes of disasters. Wielding the power of the media, institutions then rationalize these events as anomalous, deflecting responsibility and accountability. In this way, institutions assume and legitimize hazard risks as an inherent part of industrial modernity while at the same time clouding the social consciousness as to the extent these environmental burdens are calculated and distributed strategically to affect certain populations more than others (Beck 1992; Freudenburg 2003).

One of the more powerful ideas in Beck's risk society is his attention to how knowledge about risk is produced, communicated, and understood in society. Media serves as the epicenter where the public defines and contests risk as a social reality (Beck 1997). Here the public relies on the credibility and credentials of experts to help define risk and understand their potential thus shaping and mediating public faith and trust in social institutions. This does not always occur in the media, especially where trust in experts, and the media more broadly, is questioned (Peters, Covello, and McCallum 1997). In these specific situations, knowledge about risks is rooted in localized culture. Respected members of the community provide trustworthy and credible knowledge due to shared experiences and close social bonds (Gricar and Baratta 1983). Trust in experts is moderated by two main factors: previous experience with those experts and their organizational affiliation. Previous negative experiences with government or industry broadly, or in relation to localized hazard experiences, reduces trust and therefore the credibility of their message (Seigo, Dohle, and Siegrist 2004). This is particularly true for rural communities which have comparatively less trust than do urban settings in government and industry (Flora and Flora 2008).

While still useful for understanding the ways in which risk is imbedded in the social fabric of society, scholars have critiqued Beck's conceptualization of risk as both reductionist and extremist (Ekberg 2007; Elliott 2002; Straub 2020; Tierney 2014). It overestimates risk as the fundamental social issue, refusing to frame social inequality as the means by which risk is constructed, understood, and experienced in society (Ekberg 2007). Beck's overreliance on rationality also neglects to consider how cultural meaning systems and lived experience shape knowledge of risk in contingent and particular ways

(Lash and Urry 1994). Lastly, Beck focuses solely on anthropogenic risks created and recreated through technology, relegating the risk of natural hazards to some bygone era in which human ingenuity and technological innovation mastered the natural world (Tierney 2014). He fails to consider the dynamic and interdependent relationship between human society and the natural world. Recent examples of climate change and the COVID-19 pandemic illustrate this myopia. Environmental hazards of all types—including technological and natural—subject humanity to risk and are the result of decisions made (or not made) by communities, institutions, and governments (Mileti 1999).

Risk is embedded in and intrinsic to the functioning of society. As such, risk is produced by social factors (Tierney 2014). Cultural and political ideologies not only shape our understanding and knowledge of risks but in fact engineer the ways risk takes shape and are experienced by society. Owing to neoliberal ideology that has characterized economic policy over the past 40 years, fewer resources are dedicated to preparedness or invested in institutions and infrastructure that would reduce risk and facilitate recovery. The responsibility for risk has shifted from institutions to individuals in both the developed and less developed world (Beck 1997, 2008; Tierney 2015). Privatizing risk in this way structurally and ideologically absolves institutions from responsibility, the gravity of which intensifies from year to year as the economic and human costs of disasters continue to rise (McAneney et al. 2019; Newkirk 2001).

2.2.6 Resilience

While vulnerability and risk attend to the combination and intersection of social and physical factors that make individuals, groups, and communities susceptible to

negative outcomes following a disaster, resilience captures dynamics that have the potential to attenuate adverse effects. Early scholarship defines resilience as "a measure of the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationship between populations or state variables" (Holling 1973:14). The National Research Council's 2012 report more specifically defined resilience as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse effects" (NRC 2012:1). As with vulnerability, early resilience studies focused on infrastructure development and other biophysical factors as key indicators of resilience (Aldrich 2012; Aldrich and Meyer 2015). To this end, the Multidisciplinary Center for Earthquake Engineering Research (MCEER) developed a framework isolating four key dimensions of resilience. The first, "robustness," details the ability of a system to withstand stresses without losing functionality. Second is "redundancy," or the degree to which the system has contingencies put in place to operate should key functions be disrupted. The third dimension is "resourcefulness" which suggests that the system is highly adaptive to a crisis—able to identify issues, mobilize resources, and distribute them in effective ways. Lastly, MCEER identified "rapidity" or the time it takes a system to recover functionality and normalcy following the impact of a disaster (Bruneau et al. 2003). While a distinct dimension in its own right, rapidity is also related to the accomplishment of the first three dimensions.

Implicit in the MCEER resilience framework are concepts of inherent and adaptive resilience. Inherent resilience refers to properties or characteristics of a system that are designed to help that system withstand or cope with the destructive potential of a disaster (Rose 2007). Thinking about inherent resilience in relation to risk suggest that

disaster planning is predicated through a rational calculus which commits human and economic resources to address potential loss to a reasonable degree. However, owing to the fact that some risks are fundamentally unknowable and others intentionally neglected due to low probability and perceived exorbitant mitigation expenses, systems need to be dynamic and responsive. Adaptive resilience adds flexibility to organizational systems during a crisis, allowing them to respond to unanticipated situations which develop in real time as a disaster process unfolds (Rose 2007, 2011). Originally designed to measure the effectiveness of both infrastructure development and organizational systems responding to a crisis, this framework is appropriate for measuring social factors as well. Research quickly developed to emphasize the importance of social factors as key aspects in producing resilient communities (Norris et al. 2008). Researchers created a broader, more inclusive definition to capture multiple levels of analysis as well as temporal dimensions which are essential to situating resilience within the process of disaster:

> The ability of social units (e.g., organization, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future [disasters]. (Bruneau et al. 2003:735)

Resilience frameworks evolved to include various forms of capital to conceptualize social factors in distinct forms to make them open to operationalization and measurement alongside more "objective" measures such as economics, built infrastructure, and the physical environment (Tierney 2006; NASEM 2019). Norris and colleagues (2008) developed a network model for adaptive capacities which include dimensions of economic development, information and communication, community competence, and social capital. Importantly, this framework considered these factors as linked and mutually reinforcing rather than isolated or additive. Peacock (2010) similarly

suggested that four forms of capital contributed to resilience: economic, social, physical, and human. However, most of these frameworks focused on resilience of cities and urban populations. Flora and Flora (2013) addressed this dearth in research by publishing *Rural Resilience: Legacy and Change* and introduced the Community Capitals Framework (CCF). While not specifically focused on disaster resilience, CCF does provide a dynamic intuitive framework amenable to exploring the complex ways in which rural communities (in particular) mobilize resources to contend with social problems, build capacities for resilience, and cultivate sustainability. Recent disaster research has recommended the application of the CCF specifically to the context of vulnerability and resilience to natural and technological hazards (Koch et al. 2017; Ritchie and Gill 2011). CCF, which serves as the guiding theoretical orientation in this dissertation, will be discussed in extensive detail in the following section.

Although it is tempting to position resilience as the opposite of vulnerability, this is not the case. Vulnerability and resilience are not binary factors where if one is not vulnerable, they are resilient. Both vulnerability and resilience are produced, and can be measured, through a variety of social factors. Nor should these concepts be viewed as a continuum where a hypothetical increase in social resilience suggests a decrease in social vulnerability (Klein et al. 2013). Vulnerability and resilience are engaged in myriad complex, variable, contingent, and dynamic exchanges. Communities can be simultaneously vulnerable and resilient. They may possess characteristics of physical resilience while exhibiting low levels of social resilience (Tierney 2014, 2019). Communities might also have a dense, highly integrated, supportive social network but exhibit weak infrastructure making them socially resilient yet biophysically vulnerable

(Aldrich 2010). Contemporary research has demonstrated the interdependent and contingent nature of these dynamics. In some cases, communities can adaptively cultivate resilience despite, or perhaps because of, high levels of vulnerability (Straub 2020; Straub et al. 2020).

2.2.7 Rural vulnerability and resilience

Over the past two decades, concepts of disaster vulnerability and resilience have gained significant traction in academic, political, and media spheres. However, much of this work has focused on the ways in which urban spaces contend with the challenges of hazards and disasters while neglecting these dynamics in rural communities (Tierney 2019). Research addressing this has found that the primary drivers of resilience in urban spaces are primarily economic, while community factors contribute to resilience in rural communities (Cutter et al. 2016). Research on rural-urban differences in resilience have criticized the "one size fits all" approach to cultivating resilience in favor of a more contextualized and nuanced approach to space based analysis of vulnerability and resilience (Cutter 2016; Cutter et al. 2016; Rygel et al 2006).

Trends in the frequency and severity of hazard events and the more prolonged effects of climatic variability are compounded by the complex interaction between economic, psychosocial, and spatial factors. While sudden-onset or acute hazard events—such as tornadoes, flash floods, high winds, wildfires, and severe storms—are more likely to have a definitive beginning and end, chronic events like drought are more ambiguous. Additionally, acute events tend to damage infrastructure while chronic ones damage the natural environment "such as farm and ranch land, wildlife, and water

resources" (Koch et al. 2017: 6). For example, a study conducted on the series of 58 tornadoes that occurred in Oklahoma on May 3, 1999 found that risk of injury and death was much greater for those in mobile homes, apartments, or outside (Brown et al. 2002). In fact, risk of injury or death due to tornadoes is twenty-seven times higher for those in mobile homes as compared to anchored buildings (Carter et al. 1989). Risk factors are disproportionately higher in rural areas. In other words, understanding local social and living conditions (i.e., vulnerability)—and the likelihood of exposure to hazards with specific characteristics that carry the potential to exploit weaknesses in those social conditions (i.e., risk)—are incredibly important for community decision-makers contending with the challenges of disaster preparedness, response, and recovery. According to survey research, while rural areas tend to have significantly higher levels of employment in industries dependent on natural capital (agriculture and resource extraction) they consistently demonstrate less concern for environmental issues than do urban residents (Tremblay and Dunlap 1978). However, qualitative research examining this issue more closely finds that rural interviewees generally value environmental preservation but are opposed to measures that would limit their economic opportunities, restricting land use (Freudenburg and McGinn 1989). This is especially true of those in the agriculture industry.

Research has identified an array of stressors unique to rural livelihoods including the physical nature of occupations, family structure and culture, lack of job opportunities, the economic uncertainty inherent to the agriculture industry, and even place attachment (Fraser et al. 2005). The rate of injury is higher for rural farmers due to the physicality of farming and ranching. This is particularly true among older populations, who cite

physical well-being and comfort as a paramount concern (Polain et al. 2011). Addressing the needs of an aging farming population is increasingly important as the average principal operator's age has risen from 50.3 in 1978 to 55.3 in 2002, according to the U.S. Census of Agriculture (Fetsch 2006). The subsequent loss of labor power (and potential loss of income as a result) further exacerbates these risks as farmers often neglect their bodies in order to remain productive (Vins et al. 2015). Rural communities that rely on the natural environment for economic production—industries such as farming, ranching, and tourism—makes environmental stressors like hazard agents particularly hard on the psychosocial health of rural communities.

Broadly, rural communities face distinctive challenges that make them especially predisposed to psychosocial effects and other mental health issues such as depression and anxiety (Vins et al. 2015). However, while there is an abundance of research related to rural recovery following acute disasters such as floods, hurricanes, and earthquakes, there is a lack of research devoted specifically to how a prolonged, chronic disaster such as drought complicates and magnifies the economic, social, and demographic vulnerabilities of farming communities and their families in rural areas (Koch et al. 2017). This is critically important in Oklahoma due to research that suggests "…confidence is high that longer-term droughts are expected to intensify in large areas of the Southwest, southern Great Plains, and Southeast" (Vins et al. 2015:13252).

The mentality of residents in rural communities shapes these outcomes as well. Surveys and interviews consistently find that self-sufficiency and self-reliance are of utmost importance to rural communities, families, and individuals (Bosch 2004; Gregoire

2002). Reluctance to seeking help outside the family stresses those relationships even during the most stable climatic and economic conditions:

> Research has repeatedly demonstrated a phenomenon of rural stoicism that, combined with a culture of self-reliance, can interfere with help-seeking behaviors and limit effective adaptation to changed circumstances. The social visibility present in small, rural communities can exacerbate reluctance to seek assistance for mental health problems. Individuals who may consider pursuing mental health services are afraid of marginalization if others find out (Vins et al. 2015: 13259).

Even if community members are willing to seek mental or physical healthcare, the remote location and relatively low population found in rural communities makes reliable access to emergency and health services much more difficult (Gregoire 2002). Due to the remote locale, occupational conditions, rural culture, and community dynamics, emergency management and healthcare professionals face a difficult set of challenges regarding availability, access, and strategic intervention approaches to deliver critical services to rural communities (Viegas and Meek 1998).

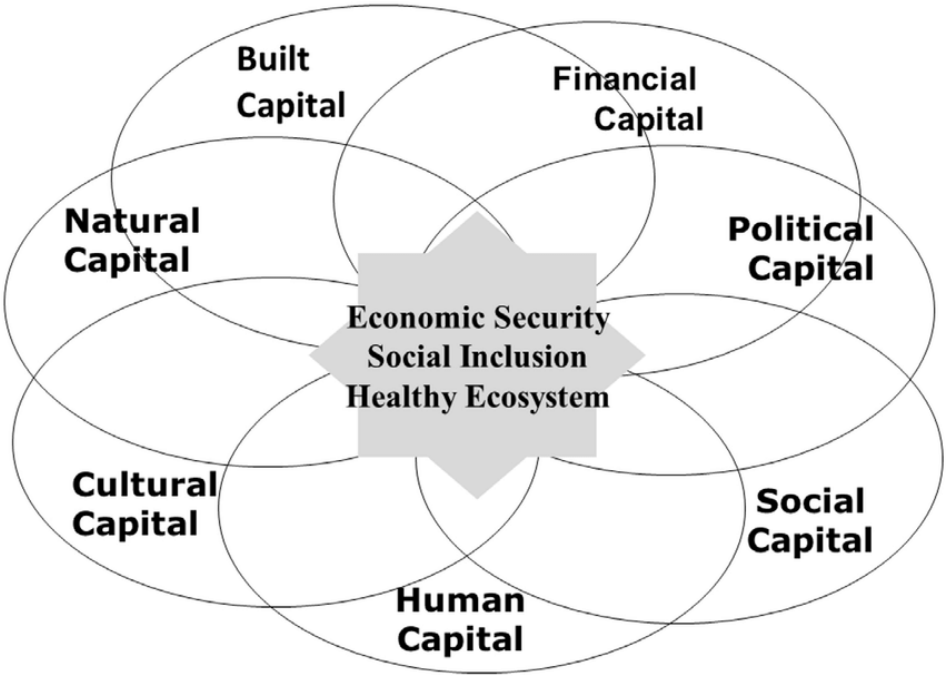
The exploration of the complex relationship between vulnerability, risk, and resilience is of central importance to this research project. The next section expands on Flora and Flora's (2013) multidimensional theoretical framework and demonstrates how it is equal to the task of interrogating this nexus of vulnerability, risk, and resilience and well suited to explore how residents in two regions of rural Oklahoma perceive, prepare for, and experience environmental hazards.

2.3 Theoretical Framework

Rural Communities: Legacy + Change examines the challenges faced by communities in rural America (Flora et al. 1992). Rural communities solve social problems through collective action (Flora and Flora 2013). Flora and Flora's (2013) work

seeks to understand the unique histories, social issues, and cultures of rural spaces and to provide an intuitive framework for developing strong, interconnected, economically secure, and sustainable communities. The Community Capitals Framework (CCF) conceptualizes the capacity of healthy and sustainable communities through seven interconnected forms of capital: natural, cultural, financial, built, human, political, and social (Flora et al. 1992; see Figure 2). These capitals may be thought of as stores of resources or assets available to develop a community or to deploy in times of crisis, such as a disaster (Ritchie and Gill 2011). While the CCF contends that these capitals exist to varying capacities in an objective sense, the perception of what these capitals look like or their utility in certain situations is subjective. This suggests that while assets may exist, community

Figure 2: The Community Capitals Framework



Source: Flora and Bregendahl 2012

decision-makers may not be aware of them or how to use them most effectively. Additionally, these seven forms of capital should not be considered independent of one another (Mayunga 2007; NIST 2015). Each of the capitals can be (and often are) converted into other forms of capital (Flora and Flora 2013). Deficiencies in one or more forms of capital may trigger increases in other forms (Straub et al. 2020). Likewise, deficiencies may generate loss spirals in and across various forms of capital (Ritchie 2004). The particular qualities and dynamic relationships between forms of capital is discussed in greater detail below.

The CCF is designed not just as a theoretical framework, but as a practical and intuitive tool that scholars and community members may utilize to understand community strengths and weaknesses (via forms of capital). Specific to emergency management and disaster planning and recovery, the utility of the CCF goes beyond being a simple diagnostic tool and can be applied as a guide and living reference for ongoing community development and building capacities for resilience (Ritchie and Gill 2011). This process requires communities to gather data and accurately take inventory of all seven forms of capital prior to a disaster event as part of their disaster planning processes. Post-disaster inventories provide valuable information regarding what changes occurred in terms of community assets (and thus which need the most attention in the response and recovery phases), which assets were most vulnerable to the effects of certain disasters, and which assets were most resilient. This information is key to identifying what resources are available and where they should be deployed to help communities recover more quickly and efficiently. Post-disaster inventories also allow for data-driven decision-making mitigation strategies to increase community resilience

when the next disaster occurs (Koch et al. 2017). Empirical research has shown how communities that demonstrate higher capacities and volume of these types of capitals experience minimal loss immediately following a disaster, quicker short-term recovery with less expenditure of assets, and better long-term prosperity (Mayunga 2007; Zhang 2006).

2.3.1 Natural capital

Broadly, natural capital can be understood as the biophysical landscape and its derivatives including soil, "air, water, minerals, oil, and the overall stability of ecosystems" (Ritchie and Gill 2011: 3). Environmental sociologists have traditionally viewed the environment as the material provider for society, enabling societal development through the conversion of natural resources into food, commodities, and infrastructure (Foster 2002; Marx 1973). More than a linear flow of materials from nature to society, ecological systems both shape and are shaped by human actions (Gramling and Freudenburg 1996a). In the CCF, natural capital is seen as a baseline source of capital for communities. Depending on their environmental stewardship practices, communities may enjoy clean air to breathe, water to drink, and food to eat. Natural capital serves as the source of natural hazards such as hurricanes, tornadoes, floods, fires, or other extreme events. However, natural capital also has the potential to provide natural defenses against these hazard agents such as wetlands buffering coastal communities against hurricane storm surge (Wamsley et al. 2010).

Natural capital is also commonly converted into other forms of capital. Traditionally in North America, natural capital was converted into cultural capital by a

variety of people and tribes as they derived cultural and religious meaning from the land (Flora and Flora 2013). The arrival of the Europeans brought a change in these dynamics. Natural resources were quickly converted into economic capital (Freudenburg, Frickel, and Gramling 1995). This took shape in a variety of ways from unsustainable farming that stripped away nutrients from the soil predisposing areas to drought and famine (Hansen and Libecap 2004), to environmental degradation caused by development which has been shown to reduce protections from hurricanes or floods (Wamsley et al. 2010; Zhang et al. 2020), poor conservation policy leading to increased risk of wildfires and economic loss (Hoff et al. 2018; Kaur et al. 2020), or the pollution of natural resources (Mohai, Pellow, and Roberts 2009). Work by environmental justice and disaster scholars has consistently found that minorities and residents of rural and poor communities bear the largest share of these environmental burdens (Bullard 1994; Erikson 1976, 1995). Natural capital and the ways in which communities preserve or convert it have profound effects on vulnerability, risk, and resilience.

2.3.2 Cultural capital

Cultural capital can be understood as a shared understanding or world view that is collectively held and passed down from generation to generation (Flora and Flora 2013). Specific examples include language, customs, traditions, symbols, attitudes, beliefs, and assumptions about the world and how it operates (Flora and Flora 2013; Ritchie and Gill 2011). Empirical studies conceptualize culture as a set of schemata for interpreting our world and repertoires of action for participation in it (Bourdieu 1977; DiMaggio 1997; Schudson 1989; Swidler 1986). Culture is used to construct strategies of action for

navigating social interactions and solving problems. Cultural capital can then be understood as an ideological lens through which the social world is understood as well as a capacity of skills—or "toolkit"—from which we can select lines of action to engage with our world (Bourdieu 1977; Swidler 1986). When life remains unchanged, so do our cultural and practical capacities as we have the necessary tools to solve familiar, routine problems. However, when facing an unfamiliar situation or crisis, we adapt these skills to develop new strategies for action, expanding our toolkit and cultural skill set to navigate new challenges (Swidler 1986).

Developing new skills to cope with unfamiliar situations is crucial for developing capacities for resilience to natural hazards and disasters. The disruption that disasters cause can irrevocably change a community's collective perception of their social and biophysical world. Referred to as an altered "lifescape," these changes "represent psychosocial responses to emphasize involving a disruption of fundamental assumptions about how the world operates" (Ritchie and Gill 2007:114; see also Edelstein [1988] 2003). Stores of cultural capital frame not just our understanding of social situations but the way communities respond. Empirical research has demonstrated how moral imperatives prompt people to assist one another following a disaster (Quarantelli 1988, 1995). Following Hurricane Harvey, cultural capital was quickly converted into human capital and built capital—personnel and equipment—as individual citizens organized independently of emergency management to perform search and rescue operations in areas of intense flooding around Houston, TX (Meyer et al. 2018; Meyer et al. 2020). In this way, cultural capital is less a structure that limits social action and more a resource for facilitating it (Schudson 1989).

2.3.3 Financial capital

Financial capital is perhaps the most straightforward, easily understood, and obvious component of the CCF and represents the collection of economic resources available to a community (Flora and Flora 2013). These include savings, investments, income, tax revenue, and available credit (Ritchie and Gill 2011). Due to the capitalist nature of society, financial capital is most easily converted into other forms of capital to build capacities for resilience. Examples are funding emergency management personnel (human capital), purchasing equipment or updating infrastructure (built capital), investing in conservation efforts (natural capital), and influencing political entities or policy (political capital).

A diverse local economy is crucial for fostering healthy stores of financial capital. Empirical research consistently finds that an over reliance on industries such as tourism or energy extraction can increase vulnerability (Freudenburg, Frickel, and Gramling 1995; Gramling and Freudenburg 1993; Gramling and Freudenburg 1996b; Murphy and Dunlap 2012). For example, Erikson (1976) found that as coal reserves in rural Appalachia diminished, so too did the population. This prompted a loss of financial capital due to the shrinking extraction economy, an out migration of younger generations looking for better opportunities (loss of human capital), a reduction in dense and diverse social networks (social capital), and a reduced voting base which limited political influence (political capital). Due its centrality in the functionality of modern society, financial capital is one of the most important forms of capital in CCF (Flora and Flora 2013).

2.3.4 Human capital

Human capital is "the capabilities and potential of individuals determined by the intersection of nature (genetics) and nurture (social interactions and the environment). It is the assets of individuals" (Flora et al. 2016: 16). Knowledge, skills, physical ability, personnel, education, training, leadership, and health are all included here (Flora and Flora 2013; Ritchie and Gill 2011). Population and trajectories of growth or reduction of population are key aspects to the availability of human capital. Within these metrics, average age (and trends regarding age) demonstrate the capacity of a community to engage with public service, the sustainability of a population, and the need for key facilities such as schools, emergency management agencies, and healthcare facilities. The presence of these facilities encourages a more diverse labor market, a larger tax base for financing public services, and a more educated population. Flora and Flora (2013) refer to the physical and mental wellbeing of a community as its overall "health status." Health status issues associated with disasters may result in conditions that are acute (mortality or injury) or chronic (protracted illnesses and psychosocial trauma). Health status is often tied to financial capital. A younger population will often indicate a healthy—or potential for a healthy—labor market.

Primary labor markets that consist of jobs which require additional training, skills, or education tend to lead to higher overall wages, opportunities for advancement, and increased quality of life. Conversely, secondary labor markets include jobs which require little training, are typically physically demanding, are low paying, and have high turnover (Flora and Flora 2013). Rural communities which tend to have relatively little diversity

in the labor market—especially those communities which rely on resource extraction—often experience out migration of younger people looking for more diverse or lucrative job opportunities (Erikson 1976, 1995). Fewer economic opportunities raise the average age of a community which increases the ratio of older residents to younger residents. The former are more vulnerable to disasters due to ableness and health (Ngo 2001). This also reduces the diversity and overall levels of education in a community. A better educated populace tends to generate more wealth and be more effective at mitigating the effects of disasters and navigating the complex challenges of recovery (Frankenberg et al. 2013).

The state of natural capital—including the quality of air, water, and food—in rural areas often translates to physical and mental wellbeing. Clearly, human capital is also tied to financial and built capital expressed by a diverse and healthy labor market which retains younger residents. Political and cultural capital also determine the level of economic investment in public services and training for emergency management personnel. However, over the past few decades a decline in education quality, job opportunities, environmental degradation due to the prevalence of secondary labor markets, and increasing poverty makes investment in human capital a significant challenge for rural areas (Flora and Flora 2013).

2.3.5 Built capital

Built capital includes physical infrastructure and equipment. To build capacities of disaster resilience, communities require infrastructure designed to withstand the impact of environmental events, lifelines for travel as well as critical facilities, equipment, and services that can respond to crises when they occur (Ritchie and Gill

2011). Critical infrastructure has long been a fixture of hazard and disaster preparedness and mitigation (Cutter et al. 2003; Cutter et al. 2010). Attention to the development of early warning systems, communications, roads, bridges, and buildings which intrinsically consider exposures to natural hazards are crucial features of resilient communities (Cutter et al. 2010; Miller et al. 2016). These features allow for early detection before a hazard event occurs, provide safety during a hazard event, allow emergency management to mobilize effectively to stabilize a community, reduce the disruption to economic and social systems, and ease community investment in rebuilding and recovery efforts (Bach et al. 2013).

Inattention to—or poor investment in these resources—can lead to catastrophe. For example, the improper maintenance and subsequent failure of levy systems led to catastrophic flooding in New Orleans following hurricane Katrina (Brunsma et al. 2010; Comfort 2006). Juxtaposing the 2010 Chilean and Haiti earthquakes illustrates the profound difference that built infrastructure can make in post-disaster outcomes. Despite the Chilean earthquake being 500 times stronger than the one experienced in Haiti, an estimated 525 people died in in Chile (Fernandez 2012) compared to an estimated 158,679 in Haiti (Kolbe et al. 2010). This discrepancy is owed to ineffective governmental preparedness and response, widespread poverty, and weakened infrastructure (Thomas et al. 2013). Long-term effects of poor infrastructure can be seen in Puerto Rico following hurricane Maria, as an outdated and poorly maintained electrical grid coupled with a protracted response and recovery effort led to widespread power outages for nine months or more after the event (Kwasinski et al. 2019; Straub 2020). These power outages created issues for medical facilities trying to provide adequate

health care to people in the archipelago, especially elderly citizens who require dialysis or other routine treatments for chronic health conditions (Kishore et al. 2018). Lack of quality healthcare also created a wave of outmigration which contributed to a loss in economic, human, and social capital (Straub 2020).

While not easily converted into other types of capital in CCF, built capital facilitates the deployment and efficacy of many other forms of capital. Most notably, built capital helps enrich human capital—supporting the physical, social, and economic health of communities before, during, and after disaster. Built capital is often the product of stores of other types of capital. Cultural, political, and financial capitals facilitate whether communities will believe in, prioritize, and invest in the value of built capital as a contributor to capacities for resilience.

2.3.6 Political capital

"Political capital consists of organization, connections, voice, and [influence] as citizens turn shared norms and values into standards that are codified into rules, regulations, and resource distributions that are enforced" (Flora and Flora 2013:144). In other words, this form of capital revolves around power. Power has always been a challenging concept for sociologists to measure due to its ubiquitous yet implicit nature (Roscigno 2011). According to Weber (1968), power is defined as an actor's ability to carry out their own will despite the resistance of others. Despite this ambiguity, power remains a central component to the sociological consideration of core social processes (Bourdieu 2000; Foucault 1980; Giddens 1984).

Two competing paradigms have emerged over time. The "pluralist" view maintains that modern democratic societies are so complex and diverse that power is distributed diffusely across its institutions so that it is not necessarily concentrated in one area (Dahl 1978). Proponents of "elitism" contend that power follows class status and economic influence granting a virtual monopoly to accessing the societal polity. Elites shape political policy and coerce the state into protecting their private interests (Domhoff 1967; Mills 1956).

Contemporary disaster research has largely focused on the effects of power during recovery processes. Risk communication and media studies have demonstrated the ability of powerful political and corporate actors to shape public perceptions of risk and institutional culpability for providing relief (Beck 1992, 1997). Following hurricane Katrina, Goldman Sachs convinced the city of New Orleans to sell them the property rights to four public housing complexes alleged too expensive to repair, dispossessing New Orleans of approximately 3,000 publicly funded homes (Kroll-Smith 2018). Prior to the *Exxon Valdez* oil spill in 1989, pro-developmental interests were able to erode regulatory safeguards despite public resistance, increasing risk and facilitating the disaster (Gramling and Freudenburg 1992). Following the *Exxon Valdez* oil spill, a protracted litigation process engineered by the oil company was successful in reducing punitive damages by a factor of 10 from $5.3 billion to approximately $507 million (Ritchie, Gill, and Farnham 2013). The impact of litigation was social as well as economic, dissolving community bonds and sowing discord among its members resulting in avoidance behaviors and what scholars call a "corrosive community—that is, a consistent pattern of chronic impacts to individuals and communities" (Picou, Marshall,

and Gill 2004:1496; see also Couch and Kroll-Smith 1985; Edelstein [1988] 2003; Erikson 1976; Freudenburg 1993; Ritchie 2004; and Ritchie and Long 2021).

CCF maintains that political capital often does not necessarily reside in political figures themselves, but in those that have privileged access to and influence over those decision-makers (Green and Haines 2012). In rural communities, political capital is closely tied to cultural capital as a community's worldview often shapes their political priorities, especially regarding taxation and the protection of property rights (Flora and Flora 2013). In spaces where there is a lack of diversity in the economic sector and the labor market, dominant corporate interests often dictate local public policy due to their centrality to the local economy and thus the economic wellbeing of the surrounding community. These corporate interests also tend to reinvest in the community, further cultivating public support (Flora and Flora 2013). Thus, political capital is often tied to financial capital. While largely implicit and sometimes unseen, political capital often dictates how communities prepare for, respond to, and recover from disasters.

2.3.7 Social capital

Broadly, social capital can be considered as the subjective and objective pathways through which social intercourse occurs, granting connected individuals, communities, and institutions access to a variety of resources through networks of trust and reciprocity (e.g., see Straub et al. 2020). Whereas other forms of capital are possessed by individuals or communities, social capital is the connective tissue that structures the *relations* between social actors (Bourdieu 1985; Portes 1998). These relations are not only

constructed but also maintained through time as actors continue to expand and diversify their membership in networks of social exchange (Putnam 2000).

Social capital is also dynamic as these associations vary by strength and diversity (Granovetter 1977). Fundamentally, the nature of social relations understood as social capital includes the objective membership in a group as well as the subjective perception of the quality of that relationship. These dimensions of social capital are often conflated in traditional and contemporary social capital scholarship. To help disentangle variations in forms of social capital, scholars created a typology to better conceptualize distinct forms. Bonding social capital typically originates from strong, close knit ties between members of similar social status and background, often in the same community (Szreter 2002). While these bonds tend to be strong, they are limited in their access to a wide array of resources given the common social condition of its constituents (Woolcock 2001). Bridging social capital encompasses relations between those external to a specific social context and grants access to a broader, more diverse set of resources but also requires more intense cultivation and maintenance of these relatively weaker social ties through increased requirements of trust and reciprocity (Granovetter 1977; Szreter 2002). These first two types of social capital did not consider power dynamics. As such, researchers introduced the concept of linking social capital to describe the structured relations of social exchange between those with more and less power. This power difference between social institutions and individual communities complicates issues of trust and reciprocity. Institutions benefit from this social arrangement by avoiding malfeasance, gaining public confidence, and preserving their political legitimacy (Portes 1998; Szereter 2002). Public faith in institutions is key to avoiding public distrust and

abandonment, or what sociologists call the concept of "recreancy—the failure of institutional actors to carry out their responsibilities with the degree of vigor necessary to merit the societal trust they enjoy" (Freudenburg 1993:909).

Over the past two decades, disaster scholarship has focused intensely on the concept of social capital and how these structured relationships contribute to vulnerability, resilience, as well as specific outcomes of disasters (Ritchie 2004; Ritchie and Gill 2007, 2018; Tierney 2014). However, most disaster studies centered on the dynamics of social capital focus on the recovery situations following both natural (Aldrich and Meyer 2015; Ritchie and Gill 2018) and technological disasters (Ritchie and Gill 2007). Relatively little attention has been paid to the importance of social capital to disaster preparedness (Meyer 2018; Richie and Gill 2018). The nature of disasters as a (potential) disruption or crisis requiring a social response makes the study of the connective social tissue which facilitates the flow of information, people, resources, and materials—all other forms of capital—a central consideration in the dynamic relationship between vulnerability and resilience before, during, and after a hazard event.

CHAPTER III

METHODOLOGY

The Established Program to Stimulate Competitive Research (EPSCoR) in Oklahoma is a recurring five-year interdisciplinary research project funded by the National Science Foundation (NSF, Grant No. OIA-1301789). From 2013-2018—with the assistance of over 50 faculty members and 250 graduate students from the University of Oklahoma, Oklahoma State University, Tulsa University, and the Noble Research Foundation—the $25 million project was designed to study the current and potential effects of climate change in the state of Oklahoma. The purpose of the project is to compile a multifaceted interdisciplinary research team focused on a variety of issues related to climate change across the state. Objectives include researching changes in flora and fauna, the impact of invasive species, water quality issues, atmospheric changes, hydrologic systems, agricultural challenges, economic dynamics, as well as cultural and social research on how individuals and communities perceive and adapt to challenges presented by climate change. Due to the diverse and variegated ecology of Oklahoma, project leads organized the state into five distinct watersheds—Cimarron (Northcentral), Oklahoma City

(Urban/Central), Woodward (Northwest), Washita (Southwest), and Kiamichi (Southeast), each with their own unique cultural and ecological character. For this study, I focus on the characteristics of the latter two (see area 3 [Washita] and areas 2 and 4 [Kiamichi] in Figure 1).

3.1 Data

The University of Oklahoma and Oklahoma State University monitored the Oklahoma Meso-Scale Integrated Socio-Geographic Network (MSISNET) to provide data to measure the way households perceive, interpret, and develop their understanding of changes in the biophysical environment due to climate change and other environmental stressors (Jenkins-Smith et al. 2017). This "Oklahoma Weather, Society and Government Survey" was spatially integrated with the Oklahoma Mesonet, a network of data collection instruments that capture agricultural, hydrological, and meteorological data as a way to map social perceptions onto empirical measurements of biophysical systems. Household data from the "Oklahoma Weather, Society and Government Survey" is administered and collected over a 2-month period each quarter starting at the midpoint and extending to the end of each season (winter, spring, summer, and fall). Data collection began in February 2014 and concluded in March 2019 (for the purposes of the EPSCoR project), resulting in 20 survey waves. The same households were contacted for each wave to construct a panel study. Panel retention ranged between 90 percent to approximately 65 percent through wave 13 (Jenkins-Smith et al. 2017:2437). Key variables include demographic information (age, income, and location); the frequency and severity of specific hazards; changes in environmental hazards frequency and

severity over time; and belief in anthropogenic climate change, its general effects on people and the environment, and the localized effects of climate change on the weather in Oklahoma. Lastly, major socio-political concerns (i.e., natural resource preservation, quality of education, the economy and labor markets, healthcare, and taxes) were considered (see appendix IV for details on these variables). Specifically, I draw upon survey data from waves 7-10 (Spring 2015-Spring 2016) to coincide with my entrance in to the field conducting in-depth interviews specific to the Washita (i.e., variable "is_washita" provided 744 observations) and the Kiamichi (i.e., variable "is_kiamichi"provided 667 observations) watersheds. These data provide macro-level demographic information and broad context about the economics, and perceptions about hazard risk for these two regions of Oklahoma. Questions regarding opinions about the realities of climate change (i.e., "glbcc;" "glbcc_risk;" "glbwrm_ok"), and experiences with specific hazards over the past year; the frequency and severity of acute and chronic natural hazard agents; perceptions about future frequency and severity of specific hazards provide a broad context from which the qualitative data can provide more nuance, detail, and specificity within and between regions. To supplement MSISNET data of household perceptions with demographic information, I draw upon data from the Oklahoma Department of Commerce. These data, taken together with MSISNET panel surveys, provide insights on macro-level information about objective elements at work in these communities including education levels; racial diversity; economic development; demographics; and concerns about socio-political issues.

Researchers from Oklahoma State University's Sociology Department were tasked with investigating how these watersheds cultivated community resilience to

climate change related issues, particularly as it pertained to disaster preparedness and emergency management. They did so through in-depth interviews with emergency management personnel as well as landowners. To achieve a robust and diverse dataset, more than 180 semi-structured in-depth interviews and focus groups were conducted and coded across all five watersheds over from 2014-2018 (target of N=30 for each watershed). Interviewees were initially purposefully selected on the basis of institutional affiliation with emergency management services. At the conclusion of each interview, participants were asked for referrals to other key stakeholders that they felt were appropriate for subsequent interviews. Interviewees represented a diverse set of stakeholders with first-hand knowledge and direct connections with emergency and disaster management facilities and operations, land use and management, as well as community decision-making and planning.

The interview guide incorporated a variety of questions[1] (see Appendices B and C). Initial items included detailing prior experiences with both acute and protracted extreme events such as wildfires, severe storms, high winds, tornados, earthquakes, floods, ice storms, hail, and drought. Next, interviewees were asked about planning: whether communities had specific plans in place and what the details of those plans were. Interviewees were specifically questioned about the availability of resources to disaster planning and emergency management including economic investment, equipment,

[1] The interview guide was updated in February 2017 to include more questions on the specifics of drought, water quality, and other water related issues. These changes were made to better integrate and complement hydrology studies that were conducted in the Kiamichi watershed as part of the EPSCoR project. Additionally, participants were asked about severe weather patterns (drought, wildfires, tornadoes, flooding, hail, high winds, winter storms, and earthquakes) individually to parse out their experiences with *each* of the environmental hazards rather than asking about all hazards in one question. This strategy was designed to give researchers better perspective on the frequency and severity of individual hazard events rather than just those that were most salient or recent to the participant.

training, and organizational and community relationships to highlight strengths in disaster management planning and processes. After canvasing their inventory of social and material resources, participants were asked to elaborate on gaps, barriers, or weaknesses in those plans. Lastly, interviewers asked participants to define what resilience meant to them. Interviews ranged from 18 minutes to more than 3 hours, with the average interview lasting 45 minutes.

A team of graduate students and post-doctoral fellows systematically conducted and audio recorded interviews which were sent to a professional service for transcription. Transcripts were systematically coded using NVivo 11 and 12 software. Deductive coding frameworks were derived from relevant literature on the emergency management cycle: preparedness, response, recovery, and mitigation to situate data temporally across disaster management phases (Cutter 2003; Drabek 1986; Flora and Flora 2013). Intercoder reliability tests were calculated using Krippendorff's Alpha (>0.80) to ensure consistency between coders (Krippendorff 2011). During initial deductive coding, emergent themes were identified through inductive coding strategies to incorporate unforeseen or nascent subjects which were important to participants (Ryan and Bernard 2003; Schreier 2012). After completing the first phase of coding, the research team met to consolidate, coordinate, and formulate an inductive coding framework drawn from consistencies between emergent themes (Corbin and Strauss 2015). Emergent codes broadly included: whether a disaster plan exists for a community and details for that plan; perceptions of climate change; perceptions of urban centers or neighboring communities; experiences relative to specific natural hazard agents; material resources available to communities; organizational and social relationships that assist with disaster and

emergency management activities; what resources communities would like to have (in quantity, quality, or access); specific challenges articulated by communities; and definitions of resilience.

While data for this project includes all five watersheds, for the purposes of this project I analyze data between two watersheds: the Washita (SW) and the Kiamichi (SE). There are several reasons for this approach. First, my own personal involvement in the field work (contacting interviewees; conducting, recording, and coding interviews; and community engagement) was limited to these two watersheds. Second, analysis of urban areas (specifically Oklahoma City) can be found elsewhere (see Gurney 2017). Third, disaster scholarship focusing specifically on the unique dynamics, challenges, and issues confronting rural communities is limited (Flora and Flora 2013; Straub et al. 2020). Last, while Washita and Kiamichi watersheds are rural regions of Oklahoma, the unique ecological and cultural features of these two regions contributes to literature on the diversity of how rural spaces perceive risk, develop vulnerability, and cultivate resilience.

The qualitative data specific to this project includes 30 interviews conducted in Washita and 26 interviews conducted in Kiamichi. for a total of 56 semi structured, in-depth interviews conducted from August 2016-December 2016 (Washita) and January 2017-July 2017 (Kiamichi). I also examine my field observations of participation and involvement in community cultural events during this period. These events included emergency management open forums, indigenous council meetings open to the public, and town fairs and other public festivities.

For this dissertation, I performed two sequential phases of coding—deductive and inductive (respectively). First, I deductively recoded interviews collected from Washita

and Kiamichi watersheds using the Community Capitals Framework. Deductive coding was performed to organize respondent discourse into mutually exclusive, yet interrelated categories of capital as outlined by the Community Capitals Framework. Once organized, inductive coding allowed emergent themes within the typology of community capitals to highlight key thematic commonalities and differences within and between the Washita and Kiamichi regions. As expected, due to the density of codes presented by interviewee discourse, relationships, conversions, and contingencies in capital emerged to elucidate not only the configuration of capital, but the relations between different forms.

3.1.1 Operationalizing dimensions of the Community Capitals Framework

Natural capital "includes the air, water, soil, wildlife, vegetation, landscape, and weather that surround and provide both possibilities for and limits to community sustainability" (Flora et al. 2016: 15). Natural capital can be seen in the ways that emergency management, community decision makers, and landowners discuss the human ecology of the community/region including natural resources, conservation, tourism, wildlife, pollution, land use, topography, and experiences with environmental phenomena including types of hazard agents and weather patterns. The interview guide questions which asked about "experiences dealing with severe weather events…," the frequency and severity of these events, and perceptions of water levels and water quality are good indicators of natural capital. Moreover, discussions regarding land use, issues with water access and quality, or topography and spatial distance are revealing aspects of natural capital.

Cultural capital is "a group's worldview, how it sees the world, how the seen is connected to the unseen, what is taken for granted, what is valued, and what things a group thinks are possible to change" (Flora et al. 2016:16). Cultural capital presents itself through observations of objective conditions and the symbolic meaning attached to them through which individuals and communities interpret that reality. Community history, perceptions of race and gender, traditions, ceremonies, religiosity, common values and beliefs, and political orientation are all indicators of cultural capital. Interviews that talk about ontology, expectations of social behavior or relationships, presuppositions about purpose, meaning, and ideology infer the presence and structure of cultural capital.

Political capital is "the ability of a community or group to turn its norms and values into standards, which are then translated into rules and regulations that determine the distribution of resources" (Flora et al. 2016:16). It is clear from both this specific definition and broad conceptualizations in the literature that political capital is closely aligned with cultural capital (Flora and Flora 2008). However, informal mechanisms include "access to decision making" (Green and Haines 2012: 239). Careful attention must be paid to interviewees' discussions regarding key members of community. Given that many emergency management officials hold positions of traditional authority within the community, they discussed their capacities for decision-making and political influence within their community, as well as the extent to which they may influence other localities. Interviews which discuss the involvement of other key stakeholders who were not interviewed also indicate where political capital resides.

Built capital is simply the infrastructure and equipment[2] that the community possesses. The survey questions of "What resources do you utilize when addressing, or planning to address, these types of events," "Do you feel that your organization/department has all of the resources it needs to address the types of issues we've discussed," and "Are there any barriers affecting" response efforts should draw out elements of the strengths or weaknesses of built capital within and across communities.

Narratives about financial capital, or "savings, income generation, feeds, loans and credit, gifts and philanthropy, taxes, and tax exemptions" permeate the interviews. Conversations during interviews often gravitated toward discussions of economic challenges in the interviewee's community and those in proximity which face similar challenges and share comparable social conditions. Given that emergency management is often dependent on taxes, interviewees often focused on the diversity of the labor market, economic opportunities, tax rates and the population base from which taxes are drawn, and funding from state or national agencies earmarked for preparedness, response, or recovery from natural hazard events. Discussions about the objective financial assets or fiscal budget for rural communities often demonstrate the dynamic ways in which financial capital can be converted. Additionally, they provide indicators about the way cultural capital shapes the decisions made about utilizing economic capital.

Human capital is "the capabilities and potential of individuals determined by the intersection of nature (genetics) and nurture (social interactions and the environment). It is the assets of individuals (e.g., health, education, training, leadership)" (Flora et al. 2016:16). Markers of human capital in interviews present themselves through

[2] Including equipment in "built capital" was not explicitly outlined in Flora and Flora's (20013) framework and is a theoretical contribution from this dissertation to the continued development and refinement of CCF

participants discussing emergency management training, personnel, educational levels, health and wellbeing, and community leaders. Once again, data from interview questions inquiring about experiences dealing with environmental hazards, resources, and barriers to effective response glean perspective on human capital.

Social capital is "mutual trust, reciprocity, groups, collective identity, working together, and a sense of a shared future" (Flora et al. 2016: 16). Relationships are key to uncovering dimensions of social capital in the Washita and Kiamichi interviews. Here, it is important to distinguish the perceptions of those relationships from their objective existence. "Good faith" in those relationships will often determine whether communities will engage with them when faced with a collective crisis (Straub et al. 2020). Questions in the interview guide that asked about experiences with hazards and engagement in community partnerships provide rich data discussing social capital within and across these rural communities.

CHAPTER IV

FINDINGS

The following chapters present the findings from this dissertation. First, using quantitative sources, I describe the unique ecological, economic, and social milieus of the Washita and Kiamichi watersheds. Broad study site description provides the foundational context from which the detailed qualitative data describes the particular dynamic provides meaning and substance. Qualitative data is organized broadly into seven sections corresponding with the community capitals framework (natural, cultural, financial, built, human, political and social, respectively). Each section is further structured according to emergent themes uncovered through inductive coding. Quotes are indicative of themes in respondent discourse[3]. Due to the small nature of these communities, data that might compromise respondent confidentiality (position titles, locations where respondents are located, or other identifiers) are redacted. Each section proceeds categorically through each form of capital. Section summaries provide a synopsis of findings from each form of capital and begin to indicate relationships

[3] Parenthetical information following quotes indicates confidential codes assigned to specific interviewees.

between themes and forms of capital that are addressed in more detail in the discussion and conclusion chapters.

4.1 Study Site Context

Before exploring the intimate, complex, and nuanced discourse as a means to uncover the intricacies of community assets and deficiencies, it is necessary to provide some macro-level context. Using quantitative data from three different sources (MSISNET surveys, Oklahoma Department of Commerce Ecosystem profiles, and 2010 US Census data) I construct a generalized relevant profile of the biophysical characteristics, demographic composition, industrial makeup, and ideological perceptions to construct a regional footprint for Washita and Kiamichi. Providing broad background information about the particular social milieus of these two regions of Oklahoma provides an analytic foundation from which qualitative analysis can build detail, nuance, and perspective through an interrogation of the thoughts, decision-making processes, and actions which shape the nexus of hazard vulnerability, risk, and resilience.

4.2 Ecoregion Diversity

Ecologically, Oklahoma contains a rich tapestry of different landscapes and ecosystems. There are 12 distinct ecoregions (terrains/sub-climates) found here. Composed of tall grass prairies, tableland mesas, Rocky Mountain foothills, dense hardwood forests, pine covered mountains, and cypress swamps (TravelOK 2020).

4.2.1 Region Profile—Washita

According to eco-region biographies produced by the Oklahoma Forestry Services (2020), the Washita region (see water basin "3" in Figure 1) of study is located

in the southwestern part of the state and is largely constituted by the "Central Great Plains" ecoregion:

FIGURE 3: WASHITA WATERSHED

Source: United Country Real Estate (2022)

> Once grassland, with scattered low trees and shrubs in the south, much of this ecological region is now cropland. The eastern boundary of the region mark[s] the eastern limits of the major winter wheat growing area of the United States (Oklahoma Forestry Services 2020).

According to the Oklahoma Climatological Survey (2022) in the past year accumulated precipitation is 25.68" for southwestern Oklahoma. This is 15 percent below the historical average for this region year over year[4].

Southwestern Oklahoma comprised of eight counties: Caddo, Comanche, Cotton, Greer, Harmon, Jackson, Kiowa, and Tillman and is home to an estimated 212,870, approximately six percent of state's population (ODC 2014b:1). Six of the eight counties in this region have seen a decline in their population (ranging from approximately 1% to

[4] average data calculated from American Community Survey 1980-2010 (U.S. Census Bureau 2020)

4%) (1). Approximately 69 percent of the population identify as white, followed by black (12%), American Indian (7%), and Hispanic (4.5%) (2).

Roughly 86 percent of people in Washita have at least a high school diploma while less than one-fifth (19%) have attained a bachelor's degree or higher. This makes sense given that the region is dominated by "low skill" or secondary labor markets (i.e., agriculture, government (military); accommodation and food services; health care and social assistance; and manufacturing/construction are the top five industries in the region) (ODC 2014b:10). Average annual income is $44,500. This is nearly 10 percent lower than the state average across Oklahoma ($49,300).

Descriptive statistics gathered from MSISNET panel surveys collected quarterly (i.e., summer, fall, winter, and spring) from fall 2015 to summer 2016 for the Washita area of study included survey questions asking about the frequency and severity of hazards (i.e., high winds, drought, extreme rainstorms, floods, tornadoes, wildfires, earthquakes, and extreme hot temperatures) and change in average temperature and precipitation (see Table 1). 54 percent of respondents indicated that precipitation has increased in the past year. 45 percent believe the same regarding temperature.

Survey respondents in Kiamichi had experiences within the past year with many different hazards. Most notable are high winds (53%) and extreme rainstorms (36%). Nearly one-quarter experienced hail, drought, flood, and earthquakes. In regard perceptions of the frequency and severity of specific hazards, responses are more equally distributed (most respondents indicated no change or were equally distributed across increasing/decreasing/no change responses). Reflections on average temperature and extreme temperatures (when compared to the past three years) did demonstrate that more

people believed these phenomena were increasing than decreasing. Predictions of future changes in the frequency of these hazards show that, comparatively, respondents expect high winds, drought, earthquakes, and extreme heat to increase over time while flooding is perceived to decrease.

When it comes to global warming, 53 percent of participants believe in anthropogenic climate change. As to the risk global warming poses to people and the environment, 41 percent of participants viewed the risk at 7 or higher (on a scale of 0-10, 10 being the highest risk) with 14 percent perceiving the risk at 10. Almost 41 percent of respondents view global warming as contributing to changing weather patterns in Oklahoma while 26 percent did not know.

Top concerns for respondents in Washita are the cost and quality of education (46%), healthcare (45%), the state of the Oklahoma economy (40%), and the preservation of natural resources (25%)[5].

4.2.2 Region profile—Kiamichi

Kiamichi's ecological composition is more complex than in Washita. According to Oklahoma Forestry Services (2020) the Kiamichi study area (see water basins 2 and 4 in Figure 1) consist of multiple ecoregions including the Arkansas Valley, the Ouachita Mountains, and the South Central Plains:

[5] Each of these percentages indicate the most extreme of concerns (10 on a scale of 0-10)

FIGURE 4: KIAMICHI WATERSHED

> A region of mostly forested valleys and ridges, the physiography of the Arkansas Valley is much less irregular than that of the Boston Mountains to the north and the Ouachita Mountains to the south, but is more irregular than the ecological regions to the west and east. About one fourth of the region is grazed and roughly one tenth is cropland. In the Arkansas Valley, even streams that have been relatively unimpacted by human activities have considerably lower dissolved oxygen levels, and hence support different biological communities, than those of most of the adjacent regions.
>
> The Ouachita Mountains ecological region is made up of sharply defined east-west trending ridges, formed through erosion of compressed sedimentary rock formations. Once covered by oak-hickory-pine forests, most of this region is now in loblolly and shortleaf pine. Commercial logging is the major land use in the region.
>
> Locally termed the "piney woods", [the South Central Plains] region of mostly irregular plains was once blanketed by oak, hickory, and pine forests, but is now predominantly in loblolly and shortleaf pine. Only about one sixth of the region is in cropland, whereas about two thirds is in forests and woodland. Lumber and pulpwood production are major economic activities (Oklahoma Forestry Services 2020).

Southeastern Oklahoma is comprised of 8 counties: Atoka, Bryan, Choctaw, Latimer, Le Flore, McCurtain, Pittsburg, and Pushmataha and is home to an estimated 222,740,

approximately 6 percent of state's population (ODC 2014a:1). Seven of the eight counties in this region have seen a decline in their population (ranging from slightly more than 0% to 4 %) (1). Approximately 73 percent of the population identify as white, followed by black (11% percent), American Indian (10%), and Hispanic (5%) (2).

82 percent of people living in Washita have at least a high school diploma while less than 10 percent have attained a bachelor's degree, 6 percent lower than the state average. This makes sense given that the region has fewer institutions of higher education than does Washita (ODC 2014a; ODC 2014b). The local economy is similar to Washita, consisting of health care and social assistance; manufacturing; accommodation and food services; construction; and mining, quarrying, and oil and gas extraction (ODC 2014a: 10). The average annual wage is $40,900, 18 percent lower than the state average ($49.300).

Among MSISNET respondents in Kiamichi, 53 percent of survey respondents described precipitation levels and temperatures as higher in 2015 when compared the previous year. When asked about the past three years, respondents attested that the frequency and severity of (1) flooding has increased (62% and 58%, respectively) while 35 percent of respondents claimed to experience an increase in the average temperature and 28 percent recalled experiencing an increase in extreme temperatures.

The most common hazard experience survey respondents described experiencing was flooding (56%) followed by extreme rainstorms (56%), high winds (37%), drought (19%), tornadoes (19%), extreme heat (18%), hail (16%), earthquakes (12%), and wildfires (8%). When asked if respondents felt that these hazards were becoming more frequent or severe when compared to past seasons, the majority of respondents felt this

was not the case. Collectively, only extreme rain was cited as more frequent (50%). However, respondents expected a change in frequency of environmental hazards in the future. When asked to predict future frequency of hazards, more respondents in Kiamichi anticipated an increased frequency of extreme rainstorms (30 compared to 11%), extreme winds (24 compared to 10%), floods (29 compared to 17%), drought (25 compared to 17%), and tornadoes (21 compared to 13%). Only with wildfires (18 compared to 22%) and hail (11 compared to 20%) did the majority of respondents expect the frequency of hazards to decrease rather than increase in the future.

Survey responses from Kiamichi participants regarding perceptions of global warming (i.e., climate change) were divided equally (53% believe global warming exists). 18 percent of respondents indicated that global warming poses an extreme risk to people and the environment, the highest percentage of any integer marked by respondents (answered 10 on a Likert scale from 1-10 with 10 indicating "extreme risk" and 0 indicating "no risk"). In the context of Oklahoma, respondents, on average, thought that climate change was affecting weather patterns, but there was parity in these attitudes (Yes = 42%; No = 34%; Don't Know = 23%).

Top concerns for respondents in Kiamichi are healthcare (50%), the cost and quality of education (50%), the state of the Oklahoma economy (42%), and the preservation of natural resources (32%)[6].

[6] Each of these percentages indicate the most extreme of concerns (10 on a scale of 0-10).

4.3 Natural Capital

The natural environment is a central consideration for those living in rural communities in the Kiamichi and Washita regions of Oklahoma. Biophysical landscape and its derivatives including weather, soil, "air, water, minerals, oil, and the overall stability of ecosystems" (Richie and Gill 2011: 3), natural capital provides the foundation for many of the sources of vulnerability, risk, and resilience for those interviewed. Sub-themes under the umbrella of natural capital coalesce around perceptions of risk associated with natural hazards; concerns related directly to water including access, usage, quality, and quality; and topography and remoteness.

4.3.1 Natural Capital—hazard risk perceptions

As mentioned previously, Oklahoma is exposed to a plethora wide variety of natural hazards. Nearly all respondents in both regions commented on experiences with and the incidence of a wide variety of extreme events including acute hazards such as tornadoes, hurricanes, severe thunderstorms, lightning strikes, wildfires, straight line winds, flash floods, ice storms, earthquakes, and hail. They also commented on the threat and incidence of more protracted events such as drought. When asked about their experience in dealing with severe weather events as detailed above, one participant simply responded, "All of the above" (DDCKTCFC). However, rural communities did not perceive the risk of exposure to specific hazards in equal measure or planning priority. Generally, both regions fixated on tornadoes as the primary danger in their community (JWEWBGJ). Both regions also indicated that while flooding is not a constant threat, problems associated with this hazard are severe when they occur. In

Washita, severe flooding inundated one community with several feet of water, necessitating the use of school buses be utilized to evacuate residents. The proximity of communities in the Kiamichi region communities to local lakes—whose banks regularly overflow during heavy rains or flooding events—make local highways impassable for local emergency management, complicating their ability to quickly respond to these crises. Rural communities in both Kiamichi and Washita regions of Oklahoma also talk about the persistence of drought conditions and the threats those conditions pose to communities. Small variations exist as those in the Washita region consistently see drought as a consistent and ever-present threat to community wellbeing. Perceptions in Kiamichi are more divided as some interviewees downplay the frequency, severity, and consistency of drought. Interestingly, the implications of drought conditions are also perceived differently between these two regions. For residents in Washita, drought is largely an economic threat for cattle ranchers and crop production. To navigate challenges posed by drought, many residents are converting to grass land and cattle ranching instead of water intensive crops as one respondent explains:

> Probably the only thing is drought. We have taken land out of cultivation, wheat. And began to put it back to grass to run cattle on instead of trying to grow crops and that has something to do with price as well but you know, mainly drought conditions… and I see more people going to grass and taking land out of cultivation which is in my opinion going to make it worse. I'd say no plan on the wildfires, you know, as of yet except for making it worse. Really I mean I know it sounds terrible but looks to me that all farmers are thinking the same thing. They can't make 'em money growing crops [so]or going to grass and, that's gonna add to the problem of wildfires (KBFC).

No till agriculture is also gaining momentum in Washita as communities prioritize moisture conservation in their soil. Kiamichi views drought conditions as a threat to their

economy in a different way. High water levels in the numerous lakes in these areas serve as tourist destinations and are a cornerstone of the local economy, and hold potential for economic growth in these communities.

After the consensus about threat of tornadoes, sporadic yet severe flooding, and the increasing persistence of drought for these communities, there is distinct variation between risk perceptions to other specific hazards in the Kiamichi and Washita regions. Respondents in Kiamichi generally saw ice storms as the next greatest threat after tornadoes. This should come as no surprise given the differences in dense forest cover throughout the Kiamichi river valley versus the Washita region. According to participants, ice storms are dangerous due to the drop in temperature and the precarity of travelling on roads of varying quality. The greatest issue during these events is the how these storms threaten the delivery of power to communities as trees inundated with heavy ice damage powerlines and cripple other vital infrastructure. Electricity coops coordinate with local contractors and even utilize prison labor to mitigate the risk presented by ice storms:

> But the electric company just went around, they cut all trees off power lines and stuff like that. They have made a big effort…. All of them. We have three different electric companies here. Every one of them went out of their way and cleared the electric lines and stuff…, and I mean even out in the country. We had helicopters doing the cutting in here and stuff (DJPOLCL).

Disruptions in power service can last days or weeks as overburdened local electricity coops—with limited qualified personnel to deal with such a crisis—prioritize reestablishing service at central hubs closer to urban centers. With such a broad area of

service, those further from these hubs must wait longer to have their power restored; a deadly proposition to a region that has a relatively large elderly population.

4.3.2 Natural Capital—Wildfire dynamics – Washita

While flooding was relatively uncommon in Washita, wildfires were a clear and consistent threat, especially as drought conditions become more and more routine. Participants argued that communities in the Washita region have been plagued by local arsonists. General consensus across the majority of interviews with folks from these communities in southwestern Oklahoma talk about the specter of a small team of arsonists that seem to wait until Autumn when the grass is driest, and the winds pick up. This group of arsonists have been systematically terrorizing the community for several years. The consequences of these actions lead to short- and long-term issues for individuals and the community:

> We got somebody who likes to go out in the country and set fires. It's very dangerous. We do everything in round mills mostly anymore and stack them on the farm. People can lose hundreds of bales of wheat that is winter forage and feed for the cattle through the winter. If it's certain areas, especially south of town because of the vegetation in the ground, it's so hard for them to get over and got canyons and creeks and stuff down there. The wildfire through the drought period have been horrible (MSPBFC).

Interviewees are not only cognizant of the variety of natural hazards they experience, but keenly aware of their relation to one another. Both regions talk about how drought leads to increased threat and severity of wildfires but in Washita, the unique conditions that surround the flora in the area—early rain in the spring encouraging the development of undergrowth and the encroachment and prolific spread of the water

intensive, invasive eastern red cedar—might actually make those fires more destructive and dangerous as two participants explain:

> We've had a lot of rain so the wildfires could definitely come back this winter because you're going to have more growth and more vegetation. The eastern red cedar I think is still a huge problem for wildfires. (DTIAFC).
> If you were to drop [a fire model into Oklahoma] in late August, 1st of August, late July when you have all the grasses cured out. You have the wheat that's curing up… [fire is] going to spread rapidly. When it spreads, then it hits the cedar and the cedar hits the oak and continues to roll on and just go. We should be having a higher percentage of money to come down and prevent these fires and try to reduce catastrophic wildfires because it's happening every year (NLBIAFC).

Rains that occur in March and April increase the density of undergrowth situated around the eastern red cedar. As drought conditions take shape over the summer months and the eastern red cedar consumes the available water in the soil, the undergrowth quickly becomes ideal fodder for wildfires. Compounding these natural dynamics, economic pressures brought on by consistent drought conditions (especially in recent years according to respondents) and poor agricultural markets have prompted farmers in Washita to strategically move away from water intensive crops like corn, wheat, or cotton and toward cattle ranching and managing grasslands. These rational economic choices enhance the risk and catastrophic potential of wildfires:

> Wildfires are a different story. We have a lot of grass mange around here. No big mountains or anything, but a lot of grasslands that they use for the grazing of cattle. The old style of making fire breaks along your fence rows and everything's pretty well gone by the wayside, because they want to use as much land as they can for the cattle and everything (TCCCJSFC).

The combination of drought conditions in the natural environment and the transition from cropland to grassland in this region of Southwest Oklahoma conspire with broader market conditions to increase the threat, severity, and potential for catastrophic wildfires in the

Washita region. Participants are fully aware of these practices increasing their risk of catastrophic wildfires but suggest they have little other choices to ensure their survival.

4.3.3 Natural Capital—water concerns – Kiamichi

Both regions have concern over the availability of quality water to their communities but the natural capital in Kiamichi, specifically access to the Kiamichi river, has led to a century long political battle over water rights that many people in the region believe is a fight for their very livelihood. The purity and low salinity content of the Kiamichi river—which flows into Lake Sardis—makes it an attractive target for acquisition by several powerful political actors. According to one respondent, the Choctaw and Chickasaw Nations have been fighting for control over these vital resources as early as the 1830s. This water not only has significant cultural and economic value to the region's tribes but to the other communities that live in the Kiamichi region as well. Local emergency managers explained the importance of these resources to the region:

> …the Choctaws fought and fought and fought not to sell that water. And that's it, that's our lifeline. We got year-round hunting, year-round fishing, boaters, jeepers, campers around that lake, just recreational around that lake. And at the end of September, August, they'll be a half a million people come through here. Half a million people here just in one week because of a big festival we have here. And that lake is packed, that lake is active all summer long... Without the lake, Clayton [town name—redacted] don't exist (DJPOLCL).

Many respondents spoke of water as the key to survival and growth for the region:

> If you don't have water, a dependable water supply, you're not going to grow. You're not going to have, that's the key to everything is growth is water. It's life.… Someday we'll grow here more and things will happen but you know, this is a laid-back part of the country, it's very rural and it's difficult to get doctors down here but the doctors that come are usually people that like to hunt and fish. That's the reason that brings them down

> here. Tourism is huge in Oklahoma. It's like 6 point something billion-dollar industry… in Oklahoma. It's a big deal (JEFSVAL).

While the contest for acquiring water rights to the Kiamichi have been intense for much of the 19th and 20th centuries, the emergence of hydraulic fracturing has reinvigorated this legal struggle as the need demand for high quality water for needed for fracking grew in Texas. A respondent close to this legal battle talked about the "bloody battle between [Oklahoma and Texas], when Texas came for the water" (JEFSVAL). Starting in January of 2007, Texas filed a Supreme Court case which contested "The Red River Compact" agreement signed in the 1970s and 1980s between four states: Oklahoma, Texas, Arkansas, and Louisiana. This agreement guaranteed all states 25 percent of the water from the Red River that flows to Louisiana, across Arkansas, and divides Oklahoma and Texas.

> At the time of the Barnett Shale in 18 or 20 counties around Fort Worth, Texas, there were 16,150 rigs. It takes, on the average, 80,000 barrels of fresh water to frack one well. They [Dallas] want to get the water before it enters the Red River and the reason is, it picks up salt content and they want to… come across the Red River into Oklahoma and get the water. We had 11 states that wrote, their Attorney Generals wrote letters of support for us when we went to the Supreme Court. Of course, Arkansas and Louisiana was [sic] with us. It's everybody against Texas. We had states around the Great Lakes, like Michigan and those states that were supportive of us because nobody wants to see something like this get started where somebody can go across state boundaries and come into another state and start taking their natural resources. It's a scary deal (JEFSVAL).

After a dedicated and arduous legal battle, the US Supreme Court ruled 9-0 against Texas claim to water in the Kiamichi region in 2013. However, their legal battles were far from over as Oklahoma City has since developed an agreement with the Choctaw Nation to obtain a permit to access 120,000 acre-feet worth of water from Sardis Lake. Every single interview I conducted in this region contained concern about the "Sardis

Agreement." Consequently, many participants expressed pessimism or futility about how this agreement will affect the local economy and community health as their access to quality water is threatened. Many respondents cited Lake Canton—a water source in other parts of the region which had previously sold access to their water to Oklahoma City—as a cautionary tale in selling their water:

> Oklahoma City because you look at Canton Lake. The same thing happened to Canton Lake. They released about 90,000 acre-feet from Canton Lake during that drought. I don't know exact year but about half of that water soaked into the subsurface and only about half of it made [it to Oklahoma City] … I think that took Canton [Lake] down, the lake levels down to 30 percent or something like that, and it devastated the community. They had to close it. No one was fishing. All the fish were dying in the lake. There is no economic activity in businesses. It was reported, I think, in NPR that these businesses were seeing drops of like 80 percent, 90 percent in revenue. It absolutely devastated that community (RDOUTAL).

Many of these communities make these agreements to increase revenue for the area but are not fully aware of the cost these agreements will have in their communities. These decisions have very real human costs associated with them as a respondent explained in regard to a similar situation involving Lake Atoka:

> Unfortunately, one of our water lawyers from Canton who worked with ORWP (Oklahomans for Responsible Water Policy) and they joined us because they saw the impact the Oklahoma City was having on these communities like Atoka. Take the water, same thing happens in Atoka. The lake turns into a four-wheeler park. There's no boats. People were out there on their dirt bikes and four-wheelers on the lakebed because there's no water. Anyway, he committed suicide not too long. He was absolutely devastated by that withdraw by Oklahoma City (RDOUTAL).

Not all communities are so pessimistic about the sale of these crucial resources. Participants argued that the city of Hugo has historically complicated this conversation. Located at the bottom of this watershed just before the Kiamichi flows into the Red River on the border of Texas and Oklahoma, does not see a problem with selling the water from

the river. From their perspective, once the water reaches the Red River, the salt content becomes unfavorable and not useful for Texas or Oklahoma City. According to participants, Hugo has not actively fought the rest of the region to sell that water, but their lack of advocacy for these other communities gives powerful political actors a foothold in the region based on their indifference.

The "Sardis Agreement" is not set to grant the City access to Sardis Lake until 2030. However, given that rights to the upstream portion of the Kiamichi lie almost exclusively with the Choctaw Nation leads many participants downstream to feel that their advocacy rings hollow with decision- makers.

4.3.4 Natural Capital—topography and remoteness

One of the more interesting points of difference in natural capital between the Kiamichi and Washita regions is the ways in which topography influence risk perceptions as well as the effectiveness of emergency management response to hazard events. The Kiamichi watershed is situated at the base and western edge of Ozark mountains and is characterized by densely forested rolling hills and small mountains. In contrast, Washita is characterized by plains, grasslands, and comparatively flat terrain. These topographical features complicate vulnerability, risk, and resilience in particular ways. According to respondents, the flat landscape in Washita contributes to increased wildfire risk as long unbroken lines of sight allow for high winds to increase the rate of spread and potential intensity of catastrophic wildfires. This is especially true when arsonists exploit these features of the land to violent ends:

> It seems like they always set the fires when you have a forty or fifty mile an hour wind blowing, and that fire can jump. It can jump that burn in

> nothing. It's really hard to protect it against somebody that's really out to try to cause some harm (MSBPFC).

More than one respondent observed that certain areas of town seem to experience different rates of environmental hazards. Wildfires, for example, occur south of town: "Most of them are south of town, they really are. I won't say there aren't any north of town, it's more irrigated. There's two different parts of town here (DTIAFC)." Other Washita participants discuss how north of town is more irrigated and predominantly crop land for corn and cotton whereas those farms south of town tend to focus on grassland and cattle grazing. Here the data suggests that ecological factors and economic decisions based on those factors are incredibly important for shaping vulnerability and risk to certain types of hazards.

The Kiamichi region has its own challenges which relate to topography. The density of forest cover and the rapid changes in elevation create issues for communicating and organizing emergency management personnel:

> The radio signals, they want everybody to go to 800 megahertz. You can't do that here. 800 megahertz is line of sight….If you put a big old tower up, it still ain't gonna see very far…because you got too many hills. The other thing is apparently the frequency of pine needles or the whatever it is. The pine needles absorbs 800 megahertz. The phone's not much different. You can go up a mountain where they get sketchy phone service, and you get over next to the pine thickets and you don't have none. Get away from the pine trees, you got better service. I think it's the pattern of the needles (DGFCANT).

Still others talk about how the changes in elevation and the roughness of the terrain make responding to remote environmental events challenging:

> We went 16.6 miles up the mountain. And we had to leave our cars behind 'cause they just couldn't make it up there….one of the Deputies has a truck so we had to jump into his truck to get all the way up to the top. And there was just a few kids partying for graduation that let their fire get out of control and it burned several acres (JGUSANT).

Remoteness was a common theme in both regions' perceptions and appraisal of their community's natural capital. Rural communities, by definition, are remote and widely dispersed. While this point may seem obvious, it proves challenging for many who live in these "frontier" spaces:

> And they don't have running water, they still haul water to their system. So where they have filtration systems on a pond, and it's all private. They're not on rural water. Because it's not feasible to supply those houses. They are scattered out enough, that it's not feasible to build the lines and supply those houses. It's not cost effective at this time (MDBJG).

Even within these regions, the complications introduced by rurality are still a point of frustration for communities coping with hazard events, as several participants in both regions discussed:

> Sometimes I want to say, "What part of rural do you not understand? You live 20 miles from the sub up a mountain, and your power is out. Well, guess what? It may be a while before conditions are right for you to be restored." Sometimes that's what you have in a rural setting (TMKECBJG).
>
> we're 30 miles, 30 miles, 36 miles, and 55 miles from any kind of emergency services that help…. But we're out in the middle of nowhere. We got nobody to respond here…. And the warning devices and stuff. And no ambulance and everything like that. Are you going to live here? No, you're not. You're not going to up and relocate to a place that don't have, especially if you're wanting to retire. Retirement means you're old. And you're getting, you want to go somewhere and kind of enjoy life and relax. But you also need to be prepared for your medical situation that could worsen or whatever, or you could have a heart attack, whatever. "Hey, Mr. Johnson. We're glad you moving to our new town, we like your new house. By the way, the ambulance is about an hour away, so if you have that heart attack you're expecting to have, try to hang in there for us. But thank you for moving here. We appreciate it" (DJPOLCL).

Remoteness is not only a problem for setting expectations and responding to situations in communities, but it also problematizes their coordination with larger healthcare facilities. Many of these communities do not have a hospital capable of addressing more severe health conditions that can sometimes follow natural hazards. As an emergency manager

explained, the logistical challenges in Kiamichi are minimized and unrecognized by hospitals in the two metro areas, Tulsa and Oklahoma City:

> It's like [the] , I don't know, fifth or sixth largest county in the state, and it only has 11,000 [people]. The people I talked to the other day at the Trauma Division meeting, she said, "Well, you're not rural. You're frontier." I said, "Whatever we are, we're out there." It was the administrator of St. Francis and a doctor from St. John's, and then some people from Oklahoma City Hospital, and they're trying to tell us how to run our medical down here. They're telling us that we have got to get that stroke patient to their hospital from three hours of the onset or we're not doing any good. They said, "You've gotta do it." I said, "Look. It can't happen. " I said, "You do realize how far we are from Tulsa?" The guy was mad, and he said, "Well, an attitude like that is why Oklahoma is 49th in medical care." I said, "Well, let me explain something to you about that rating." I said, "The county that I serve with one truck, one ambulance on duty, is bigger than some of those states that are bragging about their rating and their medical care." I said, "Their state is smaller than our county and has a million people in it." I said, "So they got a hospital on every corner, 100 yards apart. You're damned right their medical care is great because you don't have to drive a mile to get to a hospital." I said, "Here, I have to drive 150 miles to get to your hospital"(DGFCANT).

Washita adds to these dynamics in explaining some of the unique spatial challenges of living west of the major metropolitan area of Oklahoma City. Instead of focusing on response, this participant talked about the distinctive dynamics of challenges associated with detection of tornadic activity once a storm front moves to the east of their community:

> I think the news is great and very adequate until it gets east of us and gets towards the metro area, and we are forgotten out here. So we somewhat have to rely on the mesa-net [sic]. As we have it on all of our computers, we'll watch a lot of it. As long as its west of us, we can really rely on the media, but once it gets closer to Oklahoma City, or our bigger metropolitan areas, more populated, they tend to forget what's going on back out here. And then we have to rely on our own technology like the mesa-net or radars online (JBSBSFC).

To provide a bit of context, storm fronts in much of Oklahoma and the rest of the midwestern United States travel west to east. Many of these weather systems have

multiple fronts which roll across the state like a set of waves on the ocean. As this first wave breaks across the Washita region, their main source of meteorological information—the media outlets in Oklahoma City, Northwest Northeast of Washita—are still focused on the imminent threat of the first line of storms. This essentially leaves those in Washita blind to the next set of waves coming their way.

4.3.5 Natural capital summary

Natural capital is the foundational form of capital for communities (Flora and Flora 2013). Findings from interview data confirm this assertion. Broadly, the Kiamichi and Washita regions of rural Oklahoma rely on natural capital primarily to convert into economic capital. Washita relies heavily on agricultural production at cattle ranching. However, water intensive agricultural practices exacerbate the stresses put on water resources in a semi-arid climate—like that found in Oklahoma and much of the midwestern United States. While communities attempt to manage drought specific risk by converting cropland to fallow or grassland, or engage in no-till agriculture techniques to conserve water—volatile agricultural markets, neglecting basic mitigation practices such as wind/fire breaks in order to maximize economic production, and the threat of arson put them at greater risk of wildfires.

Alternatively, the local economy in Kiamichi revolves around tourism which is entirely dependent on high quality hydrologic systems provided by local lakes and rivers. However, powerful political and corporate actors have spent more than a century attempting to wrestle control of these resources away from the region. For people in Kiamichi, the long-term consequences of a short-term economic incentive to sell their

water is too costly for the future of communities in the region. Despite local public opinion and advocacy efforts, it looks like they have little choice in the matter as the Sardis Agreement stands to syphon water to Oklahoma City in less than a decade.

According to participants, topography and remoteness are also important features of natural capital. In Washita, obtaining information about severe weather is challenging due to their spatial relationship to the main provider of meteorological information. Their relatively flat topography also puts them at higher risk for tornados, high winds, and powerful wildfires. Kiamichi experiences other challenges related to communications. The hilly terrain makes communication and access to certain locations difficult if not impossible for emergency management due to technological limitations (line of sight requirements for radios and lack of appropriate transportation given the terrain). While these impediments are well understood within rural communities, their counterparts in urban areas fail to understand these challenges and seem to view rural spaces as backward, uncooperative, and apathetic—straining relationships between the urban and rural emergency management. The next section will delve into these perceptual factors in more detail as I examine cultural capital in rural Oklahoma.

4.4 Cultural Capital

Understanding the ideological worldviews of a community is crucial to gain insight on how individuals, groups, and institutions think about, prepare for, respond to, recover from, and mitigate natural hazards. Cultural capital is collectively held and passed from generation to generation, making these conceptualizations of the world—and the pathways of action people might ultimately take based on that worldview—extremely

durable. Data coded under the broad dimension of cultural capital took shape in interesting, diverse, and unexpected ways. While some sub-themes were common across the Kiamichi and Washita regions, there were significant and substantial differences in how members of these communities thought about natural hazards, their etiology, and the role of community (and emergency management) in disaster planning and response.

4.4.1 Cultural Capital – perceptions of frequency, severity, and etiology of natural hazards

Connecting directly to the previous section detailing natural capital, perceptions of exposure to natural hazards logically led to how communities perceive their frequency and severity. These data are related but markedly different from *what* hazards individuals perceive their communities endure and focus instead on how hazards have changed over time and as well as the causes of that change. Somewhat divided on the perceived *change* in the frequency and severity of these events, by and large most interviewees acknowledged that a variety of hazards are getting worse at the time of the interview. Across both regions, most respondents talked about the increased frequency and severity of specific hazards. Commonly mentioned opinions included more intense and damaging tornadoes, wildfires, and hotter summers and colder winters. Interestingly, there were similarities in interviewee narratives used to communicate the reason for these changes. Still, a significant minority of interviewees in both regions talked about how there is no overall change in the frequency and severity of hazard events.

Both regions engaged with two primary narratives to explain the changes in weather patterns and the frequency and severity of natural hazards: climate change and

natural cycles. Climate change was quickly cited by a significant portion of respondents as the etiological reason for changes in the incidence and intensity of natural hazards and weather patterns in general: "I think global warming is definitely a factor. And I think we need to control it. We're going to have to step up to the plate and do what we have to do. Now, that's my opinion (RAROBJG)." It was not uncommon for folks to articulate that their response was only their opinion and to mention how they were not scientists. In one particular case, the interviewee looked over both shoulders, leaned in, and whispered "global warming." He went on to explain that pro-climate change views were not politically popular in that area. Additionally, these participants were more likely to suggest that these conditions will continue to worsen over time. Often, those that discussed the contributions of climate change compared what they are experiencing now to conditions of the past:

> I think the storms have [gotten worse]. I think we get more, more extreme weather than what we used to, you know, as far as, more violent thunderstorms that develop quicker. You know, [we] used to have storms coming across the state and you would see them coming for a long ways (sic) before they'd ever get to you…. Now, you might have 50, 60, 70 miles before they get to you. [Now,] when they pop up they just blow out of proportion and go crazy. They didn't use to do that. From when I was a kid until now, it seems like our climate in this area has changed some. We're hotter during the summers, a little drier. Our winters aren't near as bad. Used to, just about every year, we'd get snow. Now, about every three to five years we get a snow. So, I mean, it's changed (SMEMCL)…

Participants who believed climate change to be the cause are were sometimes unsure of the degree to which climate change is responsible for these changes but are were adamant about its involvement and are were more confident that while the effects might not be felt at the moment, they will have a dramatic impact in the future.

The other dominant narrative was that of natural cycles. Most respondents who believed the "natural cycle" narratives are were far less apprehensive about this cause than those who spoke of climate change, but were just as likely to qualify their lack of scientific expertise:

> Weather usually runs in about a 10-year cycle. We will have droughts for 10 years… and then 10 years will have rainy weather. When's the last time anybody heard of July and August getting a lot of rain? Every 10 years your weather patterns will kind of change and switch. Right now, my sister [in law] lives in Washington State. They're having some real hot weather out there, and dry. They're expecting some rain. But usually sometime, they get a lot of rain. Weather patterns are just switching around in other states and it goes in a 10-year cycle. That's my theory. I'm not a scientist, either. That's about the way it seems to work (RLSMLM).

As with climate change, proponents of the natural cycles narrative often talked about their past, how long they had lived in the area, or cited other community members' tenure/experiences in the community to endorse their response.

Religion fostered another minor but reoccurring explanation for the change in weather patterns and natural hazard activity across regions. A few participants in each region referred to the Bible, citing the gospel or Revelations. Some even quoted scripture:

> Respondent 1: "…stand in the holy place, let him understand. Then let them which be in Judaea flee into the mountains. Let him which is on the housetop, not come down to take anything out of his house. Neither let him which is in the field return back to take his clothes. And woe unto them that are with child, and to them that give suck in those days, but pray ye that your flight be not in the winter, neither on the sabbath day…"
> Respondent 2: Amen.
> Respondent 1: "…For then shall be great tribulation, such as was not since the beginning of the world to this time, no, nor ever shall be. Except those days should be shortened, there should no flesh be saved: but for the elect's sake those days shall be shortened. Then if any man shall say unto you, Lo, here is Christ, or there; believe it not" (PCHEMBJG).

The consistency in these narratives and the polarizing reality of the climate change versus natural cycles argument is evident in both regions. In interviews with more than one person, it was common for different people to adopt opposing narratives in the same space. Interestingly, no one ever criticized or even addressed the opposite viewpoint. It should also be noted that many participants were unsure about the cause of changing weather patterns. Some engaged with both narratives simultaneously.

4.4.2 Cultural Capital – media salience and population growth – Washita

The most interesting difference between Washita and Kiamichi was the unique occurrence of two common narratives in southwestern Oklahoma. Approximately one quarter of participants attributed their opinions about changing weather patterns to subjective perception rather than objective fact. Participants argued that weather patterns are likely the same, but the proliferation of media, social media, and technology only make them appear more frequent and severe:

> Over the past 10 years, technology has gotten a lot better with smartphones, so you've got up to date stuff. I don't know if they are more frequent. They seem to be more frequent just because of the sources that we have that notify of these things. Who knows if they are more frequent but they definitely seems (sic) to be more frequent and I give a lot of it to the sources that we have that notify us of these things (JBSBSFC).
> 30, 40 years ago, something would happen. You may not hear about it, because it wasn't the news. Now, with the media and everything, anything can happen across the state and we hear it within an hour. It's just more information getting out. People may think that it's happening more often… [but] i. It's just the information's there faster now (TCCCJSFC).

Still others attributed changes in the perception about hazard frequency and severity to demographic changes in population and residential development:

> I think because the towns are growing out instead of ... they're not staying put. They're kind of expanding (BOVFLGFC).

> I really anticipate, too, that water emergencies, lack of water, drought and stuff like that, I anticipate that it's going to get worse in the future, if nothing else, because we've just got more people, use more water. You don't really have to have a drought to have a water emergency (LMASFC).

As with the narratives of climate change and natural cycles, it was not unusual to find inconsistencies in the narrative perceptions of respondents. They were likely to combine or borrow from multiple narratives in their explanation, as described by this local insurance agent illustrates:

> Respondent: I don't know, the frequency seems about the same. The severity's probably worse just because we build bigger houses and bigger barns. Irrigation systems that we insure cost so much more than-
> *Interviewer: The damage is greater?*
> Respondent: The damage is definitely greater just because the property. I don't know the frequency; it seems like it's more frequent but maybe we publicize it more than they used to.… We're definitely more diverse. I've lived around this area my whole life other than college and it's more a diverse risk. I never worried about flooding. The creek would get out ... but for cattle or something but it wasn't anything you couldn't handle. There was no flooding, there was no earthquakes for sure. If I'd have sold earthquake insurance when I first got into business, people would've probably turned me in for trying to scam them or something. It's a more diverse risk, no doubt. Hurricane, we had a hurricane here in town…. Storms haven't been bad, there's been some, but I would assume that just like anything else it's cyclical and they could see it becoming more frequent (DTIAFC).

This quote highlights another interesting dynamic in the narratives of natural cycles, media salience, and demographic/developmental change: the observation of unique and unprecedented hazards. Some bear witness to unprecedented events not historically endemic to the region (e.g., the mentioning of hurricanes in the previous quote). Other participants noticed shifts in the frequency of rainfall from one space to another. The following quote might indicate how participants rationalize these inconsistencies or contradictions:

> One of the biggest hail storms we had was in September, October, about four or five years ago. Very late, weird storm that came in and just ... Soft ball size, tennis ball size hail, which was unusual for a fall storm. It can happen. It's Oklahoma. Anything can happen in Oklahoma.

Because Oklahoma is home to such a multitude of extreme hazards, any deviation from historical trends or memory was considered justifiable because "anything can happen in Oklahoma." Ultimately, there were a multitude of different narratives in both regions which seek sought to explain the perceived changes (or lack thereof) in both regions. These narratives have the potential to be a powerful force in risk perceptions as well as the conditions of vulnerability and resilience for these communities.

4.4.3 Cultural Capital – perceptions of topography shaping exposure to hazards

Just as topography factored into the types of natural hazards communities experienced, there were also interesting localized cultural ideas about how topography influences the risk associated with experiencing hazards when they do occur. Here, respondents discussed how certain features of the landscape protected them from certain hazards. Offered as myth in some cases—and truth in others—the location of their community combined with topographic features that surround them were thought to shield communities from experiencing a disaster as these folks from Kiamichi explained:

> I think, that what it [the tornado] does, is... We're kind of in between these hills or mountains…, I don't know if you'd call them mountains, I think that's the only thing, I think they hit and kind of bounce over (RLSMLM).
> So, I mean that's ... Most of them [tornadoes], they'll come up to Clayton, they split, go out around us, and come back to together on the other side (SMEMCL).
> We're in a valley, we're surrounded by mountains on both sides. And if it drops down in here, we have been lucky the last couple years. They've hit outside and took another route. We have storms will hit here and just kind of split, we're lucky that way, we're lucky (DJPOLCL).

Others within that same region in southeastern Oklahoma spoke about how the topographical features that protect one community leave another exposed:

> We think that this big mountain is preventing tornado formation. Then Talihina is over here the end; it's not next to the mountain. It seems that once these fronts pass through the valley and they get to the end of the valley and they don't have this influence from the Buffalo Mountain anymore, that the tornadoes tend to from. That's what we feel like. We feel like that Talihina is more susceptible. Out of this whole area, Talihina is the most susceptible to tornadoes (RDOUTAL).

These local legends are not unique to Kiamichi. Respondents in Washita also commented on the influence topography has on shaping outcomes in their communities:

> Tornadoes, we've been very fortunate. Fort Cobb, [A]according to Indian legend and it's been true…, that Fort Cobb will never sustain a direct hit from a tornado because we're actually in this little valley. Right south of town, the ground is higher, and we have never had a direct hit in the town proper of Fort Cobb… Whether that's a true legend or not, but all the old Indians around, they ... Native Americans, they say that's true. It will never hit and that's from the tribal chiefs and from a long-time history. It's been true so far. Both know it, that [if a tornado] decides to come into town, it's going to come into town. The hill ain't (sic) going to stop it. (MSPBFC).

As with etiological narratives, topographical ones are were expressed as collectively held. However, some individual participants doubted their legitimacy. Whether or not there is any objective truth to these claims is somewhat irrelevant (however, there is limited scientific support for topography influencing weather patterns—like convective storms which can produce tornadoes—for specific locations (Katona et al. 2016)). What is important within the context of cultural capital is that these narratives were prevalent in both regions. This suggests that they are still widely circulated if not widely believed.

4.4.4 Cultural Capital – rural community identity, rural stoicism, and resilience

Community identity and the social dynamics implications derived from this identity were of critical importance to all participants. In large part, interviews focused primarily on the relationships individual participants had to their communities and their rural lifestyle. Nearly every participant in both regions was incredibly proud of their community and being considered "out in the country" or rural. They often romanticized the challenges this lifestyle presents and felt immense pride for enduring the severe conditions found in Oklahoma:

> People of Caddo County are tornado-shy, I'll guarantee you, because we have had our fair share. Two years ago, I believe it was, our county, Caddo County, had the most disaster declarations of any county in the United States. That speaks highly of the tornado problem, hail problem, high wind problem, things like that. That was kind of a dubious honor, but the commissioners were notified that we had the highest number of disaster declarations of any county in the United States. They don't call it tornado alley for nothing, I don't guess (LMASFC).

> Oklahoma's typically, in the national ranking, usually about the thi3rd nationally in presidential declarations, or disaster declarations, so they've got a lot of experience and know what they're doing (BSACE).

Calling a place home that is consistently one of the most disaster afflicted spaces in the United States provides rural communities with a sense of dignity and self-esteem.

> Respondent 1: Well, I agree. All the financial shortcomings and natural disasters on top of manmade disasters we have had here in the however long this town's been here, forever, it's still here. And we're in pretty bad shape right now and we ain't (sic) going anywhere. I mean, this poor little old community in this part of the world can take a beating. And we ain't gonna (sic) go nowhere (DJPOLCL).

> "You know what? Our kids have turned that into a badge of honor." He said, "There's probably nothing that they can't overcome." I think our people ... I think we have a resilient community around here, because you might come walking in after a disaster or something like that, and you may be shaking your head that that we got people doing what they're ... Some

> of the way that they're living, or whatnot, but they're going to come back (SWAEMFC).

Living for generations in spaces exposed to frequent, diverse, and intense weather is a not only a testament to the strength of community but to their interviewees' individual and collective character as people. This character was conveyed as an unshakable hope and faith that they, their community, and their way of life will persist and even thrive:

> They're going to farm up every dollar that they have because that's their character. That even though they may be losing money, they're going to stay in there and hopefully that'll turn around and they'll come back. Just the work ethic to stay out there… The real resiliency there is just a good character. That they're going to stay after it and hopefully they'll be blessed by that and they'll make some recoveries, but they're just tough people and they're good people. As long as they can keep going, we can keep going, we're going to battle through some of these tough times and good times will come around (MSPBFC).

Natural hazards, and the disasters that inevitably follow, were not conceptualized as disruptions so much as a part of their life in Oklahoma. The consistency of vulnerability and risk fosters an allegiance and devotion to the people and communities where they live. Washita and Kiamichi interviews participants emphasized the importance of the translation of risk to community bonds and strength. Nearly all respondents mentioned the ways in which community members feel not just responsible but dedicated to one another. This commitment was elaborated on so frequently and fervently that the space I dedicate to the following passages from Kiamichi interviews that illustrate this narrative hardly do it justice:

> All the other small little communities, if they have fire, they'll send it. Le Flore County had an ambulance they sent, Choctaw Nation sent an ambulance. We kind of take care of each other… It's just one of them things around here, it's all you got to rely on is one another (DJPOLCL).
> [T]hat's what's good about a small community, everyone helps everybody. If they don't, you wouldn't get nothing done. It was just like I was talking, I want to get them dogs. I was a dog catcher a while ago. Not so smart

> when the trees got blowed over by the school and stuff, he goes around and he says I have a chainsaw, do you want me to help cut these stuff up and get them out of your way? How many peoples does that? You know? It's just helping each other, helping your neighbors is what it is. Helping each other (RFLSMLM).

This mentality is just as prevalent and adamant in Washita as these three quotes demonstrate:

> We realize it is what it is out here. In western Oklahoma there's going to be tornadoes, there's going to be hail storms, there's going to be ... if weather was the factor on everything nobody would probably live in Oklahoma. You live because of the people and because of the community that you have. You have people that will work together with you to get through any hard times (DTIAFC).
> Respondent 1: We've seen about everything. We've seen the tornadoes, the fires, the earthquakes, the hurricane that flooded us. It was a hurricane. It spun right over the top of us. So we've seen about everything. We've seen disasters of all kind, so being from where we are, I think we are very resilient whether it is today or in the future, we're always going to be that.
> Respondent 2: And there's always somebody there to help, it seems like. In Oklahoma, somebody will help us during these disasters (JBSBSFC).

A few respondents have a term for this type of community engagement—the Oklahoma Spirit:

> As far as farmers, it's the same way. Somebody gets hurt, gets injured, everybody jumps together. Put a crop in, get a crop out. Take care of cattle, haul cattle, new cattle. It's always been that way and that's part of being Oklahoma. It doesn't matter if that's Oklahoma City, Tulsa, Lawton. The Oklahoma spirit I think is real. I think it's a very real thing in Oklahoma. My son has worked in Ohio and Indiana. The relationship that people have are different in different areas of the country. He was not impressed with the people of Ohio. He said, "I just don't see that they would come together and help anybody in any situation." He was up there about two years. He said, "They just don't care." He said, "Everybody had a little clique," and that was really all ...
> In Oklahoma, if somebody's hurting in Moore, Oklahoma, we load up. We'll take equipment up there. We don't know people in Moore.… You might know somebody. That's just the way Oklahoma is and people… out of Kansas. I know we've done some mission work in Wichita, Kansas. Got to meet some people up there that they had a barbecue business in the Del city. The Moore tornadoes, they came up, set up shop and fed thousands of people every day out of pocket. Just made it available and this is out of

> Kansas coming down to help us. I think the Oklahoma spirit is very much alive and I think it's a very good thing (MSPBFC).

The Oklahoma spirit is something that these respondents feel is unique to the state and rural areas. Mention of this quality is explained as something not found elsewhere and gives community members an increased sense of pride in living where they do.

The fierce commitment to community articulated by respondents in both regions leads organically to their discussion of widespread volunteerism. Many respondents described that these communities rely on these volunteers to navigate many of the normalized challenges presented by natural hazards in rural Oklahoma. As this respondent explained, they feel compelled to volunteer because they know that it could happen to any of them.

> So being in this location right here, you know we're in an excellent spot and the fire fighters or people like me, we're the farmers that own the land and that's one reason we like to volunteer because usually when the fire whistle blows it's usually going to be on one of us. You know, so we're just kind of helping each other (KBFC).

With little financial or technological means in both quantity and quality, rural communities in this study find strength and support in members of the community taking it upon themselves to donate their time and train themselves for community services like fire, rescue, storm spotting, and fundraising for survivors.

The intergenerational adoption of this mentality presents an interesting divergence in themes between the two regions. While the next generation's positive involvement and engagement with community service and volunteerism was only briefly mentioned in Washita, in Kiamichi many respondents demonstrated expressed frustration and disappointment in the lack of these values in their youth:

> They're not volunteering. I'm not sure how old you are, but the younger generation from even 35 down, they're just not a volunteering group, very few of them. They're happy to tell you how to do it and they're quick to criticize when they don't get what they want, but they're not willing to volunteer and help. If they don't get paid, they ain't (sic) going to do it, and that's really hurt the volunteer fire service. I'm maybe off rambling, but [t]hey don't seem to have the sense of dedication to community and public service that the next generation above had, and it's just hurt all of us (DGFCANT).

Some of the respondents in Kiamichi aligned with this concern about future community resilience. Community self-reliance on volunteerism as a supplement to the deficits created by a lack of financial resources which pay for a variety of critical emergency services like fire and police, up to date equipment, and early warning systems makes these communities vulnerable should the next generation choose not to follow in their footsteps.

4.4.5 Cultural Capital – the rural/urban divide

Kiamichi also demonstrated a unique distinct narrative in relation to their rural identity that was not apparent in Washita. While Washita interviewees did highlight their economic disparity in terms of resources present in local, rural disaster management compared to urban centers, most interviewees participants in southeastern Oklahoma described a different relationship with cities. Beyond mere economic dimensions, they exhibited a palpable disdain and distrust for urban centers in general, but especially for Dallas and Oklahoma City. These respondents described a relationship where rural communities in Kiamichi are only valuable to these cities when it suits them financially or politically. When it does not, they are abandoned. Many respondents were resentful

of this opportunism and the potential costs it might one day have on for these communities:

> And don't come crying to us or wanting to help to us after it's too late. When this town is about dead or a tornado whips through here, don't show up here wanting to help me. Don't. It would not bother me to shoot you and put you in a hole right here and never find you again. I don't want the help after the fact. We hear it all the time. We hear it all the time. It's sickening. We're here, "I'm running for this, we're going to help these small," shit. Once you get elected you move on, we don't ever hear crap again. But when something bad happens, they want on the news. This fella will jump on a damn helicopter and be on the news. "We're going to help this ..." Just to get on the damn news. Don't come helping after the fact. It's a joke. And that's what we have right now. It's what we have right now. But when it comes to stuff like this, we don't have what the big cities have. We don't have politicians here to support us. They do during elections, you know? But it's just, and it's not like we wouldn't do this every year. One good time we could put our town in a better situation. And it wouldn't take nothing. But one storm coming through here, some of these people wouldn't recover. Even with the help and the support of a community like ours, it'd ruin us. It'd ruin us (DJPOLCL).

Distrust of urban centers is unsurprising due to the legacy of conflict between this the Kiamichi region and urban spaces. Community members in Kiamichi this part of the state have been engaged in an unrelenting battle over the right to their water for nearly 200 years. Recent generations recall Dallas and Oklahoma City exerting their political and financial power to take their water, a natural resource many members of these communities see as their most vital asset. This rural/urban divide creates an environment of isolation and insulation in which community members feel as though they can rely on only on themselves to navigate the challenges disasters present. One respondent described this volatile relationship with those seen as “outsiders” and how he cultivated a positive relationship with the community:

> You've got to come back down here, they've got to know who you are. You've got to live with them… and you've got to," when I came back every weekend from Thursday night to Sunday, I made two to five events,

> everything that I possibly could to make sure I stayed in contact with them and they knew if you love it, [i]f you love it, if you love fighting for your people. There's certain things, you already have values that things that are important enough to you that you're willing to take a stand. …I think that the people understood that…NPR radio come in and a gal came out of Dallas Texas and stuck a microphone early one morning. I didn't get want to get in my seat until, she stuck the microphone in front of me and she said, "You just don't trust Texas, do you?" I said, "I don't trust many people in this building, lady. I'm telling you right now." I said, "No, I really don't." I said, "For me to trust Texas would be like giving Jack the Ripper seven hunting knives on his promise to only use them at the dinner table." I said, "No I don't trust Texas" (JEFSVAL).

As a result of this antagonistic rural/urban divide, community members in Kiamichi insulate themselves deliberately. They believe that help from the outside will only arrive if it is politically advantageous to those government and urban entities and by that time, it would be too late. This community disenfranchisement leads to a rejection of those that they feel abandoned them. Instead, they focus their energies inward on those that struggle alongside them.:

4.4.6 Cultural Capital – preparedness and adaptation

Community self-reliance has other interesting effects on the ways in which the Washita and Kiamichi regions conceptualize resilience. Broadly, respondents from Kiamichi emphasized the importance that preparedness and planning haves for disaster resilience. Other than community support and volunteerism, the most critical aspect for these folks is having investing time, energy, and people in preparedness efforts. While a few participants mentioned they had no organizational plan whatsoever specific to disaster response, the vast majority talked about the importance of planning as for their community-level planning:

> Knowing what needs to be done in the face of an emergency. I feel like the more prepared we are, I think the less stressful it will be during the event. Of course, our job, focusing on preparedness is everything (SPACCANT).

For emergency managers in these communities, having a solid plan allows them to communicate, coordinate, and deploy their resources in strategic and efficient ways. Details of these plans focused on training personnel and volunteers in advance for the wide variety of hazards they are exposed to prior to an event. Next, they prioritized creating and maintaining communication networks crucial for coordinating resources such as people and equipment during a crisis. Many detailed preparedness as an ongoing process and referred to their specific plans as a "living document." However, as this respondent suggested, preparedness requires flexibility:

> [T]o be resilient is to be proactive is to be ready for it before it comes, and that's resiliency to me, and to be ready to adapt obviously as problems come around, but your best thing to do is to be ready for it before it hits. That's what resiliency to me really is… to be ready for it before it hits, to be prepared. But as far as resiliency, there's also being able to adapt as the problems come, as they hit you, you need to be able to adapt (TMKECBJG).

In contrast to Kiamichi, Washita seemed to rely specifically on their community self-reliance through disaster response rather than an emphasis on planning prior to a hazard event. Emergency management personnel did mention how they were officially required to have a disaster plan but that having a plan is mostly relegated to advising individuals on how to prepare themselves. Official response efforts were not disaster specific but organized under other emergency situations like car accidents. Here, preparedness and risk management were largely considered to be individualized tasks. Landowners and community members spoke about individual preparations they make such as stocking enough feed to last them through the winter, building fire breaks to slow

the spread of wildfires, building maintaining fences to protect livestock from streams that may overflow during a flood, and insuring their property and assets against individual loss. Disaster management became a collective effort almost entirely during response and recovery efforts after an event occurs.

> No. We do not have any zoning on how people build their houses. Most people want to try to build their house where it will withstand some of these things. We basically don't have any code enforcement in our county as far as how they build it… Right now I can't see us as far as doing anything different than we have been. Unless the severity and the ... Starts getting worse or more frequent, I can't really see that we're going to be changing anything ... that we'll require people to do. Unless we see a lot more damage than what we have been seeing from earthquakes, I don't anticipate anyone in our county wanting to go to extra expense to change designs on different things, on their building, or whatever (DDCKTCFC).

This respondent described a reactionary perception of risk that characterizes the position of most respondents in Washita study participants. Emergency management and landowners largely rely on emergent response efforts and adaptation when crises occur. Many of these respondents detailed articulated the unpredictability of disasters as a reason not to prepare for them. In this respect, many considered preparation to be largely ineffective and wasteful, as these two interviewees explained:

> Some of it's useless. I'm bad about saying that a lot of the stuff the feds plan for is useless, but still we have to do it. The best I can say about the situation, emergency situation like that is that in our county, and basically all over Oklahoma, everybody works together so it's not as bad as it could be (PPMFC).
> Yes. I guess adapting. Really being able to adapt to an environment as being resilient. It's always tough to predict what's going to happen, but to improvise and find solutions as they become apparent. I think that's resilient side of humans in general. You adapt to something (NLBIAFC).
> Overall, the worldviews in both communities revolves around self-reliance. Simply put: "…we are proud to help one another around here and be a part of that… It's all you got to rely on is one another. We can handle our own" (DJPOLCL).

4.4.6 Cultural capital summary

Respondents are keenly aware of the natural hazards that are of most concern to them and their communities. They also recognize that damage and loss due to these hazards has increased in recent years. However, a significant minority of participants do not connect these adverse outcomes with increased frequency or severity of recent hazards. Instead, they attribute these changes to increased development and the proliferation of media which bring more attention to crises when they occur when compared to the past. ODC and MSISNET data suggest that population and economic development are declining in these regions, providing an empirical objection to respondent claims.

While local experiential knowledge about hazard specific risks is well founded, consistent, and understood across respondent interviews, the topic of climate change is more divisive. Interestingly, while MSISNET interviews suggest that more than half of Oklahomans believe in the reality of climate change, experiences during interviews help to highlight why public discourse does not necessarily reflect these survey findings. The politicization of climate change has produced a social environment where pro-climate change beliefs are stigmatized, making respondents reluctant to proclaim these views. Moreover, cultural legends and folklore about topographical features provide interesting insights on coping mechanisms to protect ontological security in a landscape exposed to a litany of dangerous natural hazards.

Ontological security is incredibly important to folks in Washita and Kiamichi. Rural stoicism—characterized by individualism, self-sufficiency, hardiness, and a determination to persist despite hazard risk—is a distinct part of cultural capital shared in

these two regions of Oklahoma. Paradoxically, this strong sense of individualism is complemented by the *Oklahoma Spirit*, a social responsibility to help a neighbor (and Oklahoman more broadly) in need. This carries over into a strong culture of volunteerism in these communities. With little financial assets to staff a multifaceted, "professional" emergency response coalition, volunteers are an essential asset to navigating challenges related to staffing.

4.5 Financial Capital

In the context of community capital, financial capital is defined as the collection of monetary assets available to communities. Due to financial capital's formation as a combination of various monetary instruments, it is highly liquid and able to be quickly converted into other forms of capital (Flora and Flora 2008). Rural communities are typically characterized as deficient in stores of financial capital relative to urban spaces. Below, emergency management officials and landowners outline the ways in which financial capital is invested in their local communities, as well as the specific pathways they have to access these resources at meso- and micro-levels.

4.5.1 Financial Capital – cost of disaster: macro implications and micro impacts

Respondents from both regions often discussed the financial challenges of preparing for, responding to, and recovering from potential disasters in their communities. When asked about particular barriers they face in regard to the disaster process, as well as what resources they wish they had, participants overwhelmingly responded "more money."

> I hate to say it, but emergency service is just like everything else. It all boils down to money. All boils down to money (LMASFC).

When interviewers followed up with questions as to what that money would be used for, most respondents explained that they wanted more equipment, training, and personnel—a testament to the liquidity and conversion potential of financial capital. Interviewees in both regions also talked about the immense expense incurred by disasters:

> Ice storm, that I remember. That was a $1,200,000 for this little old county here… We do what they call a project worksheet for each individual road, tin horn, it's a long process, but it paid off very well. It's worked out for us. Yeah, they help us out. You don't get all of your money back, but you get quite a bit of it. You get all but 12 and a half percent… 75 percent basically comes from FEMA. And 12 and a half percent comes from the state (SPACCANT).

Here, this respondent from Kiamichi detailed the interaction between federal aid and local investment. According to the Stafford Act, local municipalities must invest 12.5 percent of the total appraised cost of recovery. The state of Oklahoma would pay another 12.5 percent. With these financial commitments in place, FEMA would then fund the remaining 75 percent of the cost (Stafford 1988). This arrangement is designed specifically for recovery and not preparedness, mitigation, or response. Interviewees in both regions commented on the limitations of structuring disaster funds in this particular way, as it does nothing to reduce vulnerability or risk for these communities.

Regarding the process of individuals applying for and receiving disaster relief from FEMA (in the form of housing assistance and property and income loss), respondents described very polarized experiences. Some respondents lauded FEMA for expediency and generosity during the recovery process for acute hazards like floods, tornadoes, and straight-line winds. Many others commented on how the process was

protracted and difficult to navigate, discouraging them from engaging with FEMA in the future:

> Respondent 3: I'm saying though, the last time you used FEMA, it took a couple of years to even get any money…
> Respondent 1: It took over a year…
> Respondent 3: As long as we document everything, they'll come in and help us. There is so much paperwork and time spent on it, it's almost not worth it to us. We could just go take care of the problem and take our losses on the labor and stuff…
> *Interviewer: So, they won't pay for labor at all?*
> Respondent 3: They do, but I can do it, and it takes them two years to get all the paperwork done and everything done. I'm wasting their time with that paperwork… it costs us a lot (RLSMLM).

Another interviewee described a situation where a claimant was misinformed or uniformed about how to proceed with their claim. As an emergency manager explained, this couple was under the impression that they would have to raze and then rebuild their house with aif they accepted a government loan. If they did not qualify for the loan based on income, assets, or other financial criteria, they would be afforded a relief payment they would not have to pay back. Since the couple misunderstood these conditions and only wanted to repair their house, according to this interviewee they never filed:

> What [FEMA] will do is say, 'Yes, you've got the maximum amount of damage and here's your check, fix your house or start over, but here's your check.'" I took them back up there, and this family was so worried. This young couple were not very educated, and they never done anything. They never filed. They could have got $30,000 to fix that house, or they could have got the low interest [loan]…That's something else that I didn't like is when you apply, they send you out a credit app for a government loan. If you don't get the government loan, then they give you money… But, what they could do is when they get the loan it's for like one percent interest, and you can pay off your whole house, do your repairs, and have your house payment down (DGFCANT).

There was significant disparity across both the Kiamichi and Washita regions in participants knowledge of the way FEMA funding mechanisms work in practice.

Respondents often articulated widely varying perceptions of how FEMA relief operated, how to navigate the claims process, and the amount of effort and time required for individual claimants. To add complexity to this already convoluted and inconsistently understood process, one respondent explained a caveat to FEMA relief:

> If I remember correctly, we didn't qualify because a certain amount of people had insurance, so we didn't qualify for FEMA assistance (JWEMBJG).

According to this participant, if the ratio of insured individuals hits a particular threshold, survivors are ineligible to receive aid from FEMA for recovery. The specific implications of this policy will be detailed later in this section.

Beyond relief programs designed to address recovery efforts after a hazard event takes place, FEMA and the federal government also provide other programs and incentives dedicated specifically to preparedness and response. Folks in Washita described a one-time federal government funding program to enhance the technological deficiencies in rural fire departments:

> [T]he federal government stepped in there and they started helping all rural volunteer fire departments and we're probably the best in the county with equipment. We've gotten new pumpers. We've gotten new brush trucks. And it's all through grant money, through the federal government. And that's helped immensely because when we do have a fire, there are so many small departments that can come with good equipment that we can usually, you know, get that under control (KBFC).

Participants across both regions talked about federal tax incentives for being a volunteer fire fighter ($400 deduction of taxable income annually), federal partial reimbursement for equipment, federal drought relief programs to help farmers and ranchers navigate poor economic climates, and state reimbursement initiatives to encourage farmers to

build fencing to protect cattle from floods and ensure water quality (by keeping livestock waste out of water supplies).

However, most respondents mentioned the infrequency of financial support beyond their own communities for preparedness and mitigation measures. For example, a state-wide reduction of state funding for agricultural educators from Oklahoma State University Extension Services is reducing community access to knowledge designed to mitigate the challenges of rural farming and ranching. One extension agent explained the impact of this policy which would reduce the number of agricultural educators by 33 percent by 2019:

> Other than funding, we're all fighting for our jobs right now. They're talking about, we have 150 educators, they're talking about losing another 50 in the next two years. So, we may not be here to help anybody. So funding is critical. Fight to keep their jobs right now. That's why I'm working two counties. Because the counties couldn't afford a full time Ag educator for the counties (DNOSUEFC).

Many respondents tangentially discussed the value that these educators have in organizing farming and ranching coops to help educate the local community. Topics of value and interest included: increasing operational efficiency through new techniques and technologies, successfully navigating challenges posed by drought, financial literacy and debt management, and building/maintaining/strengthening community relationships as a latent effect of coop membership and participation.

Most participants in both regions discussed the lack of adequate quality and quantity of equipment—this discussion will be addressed in the built capital section later in this analysis—but it bears mentioning that commentary from both regions described a "trickle-down" economy of funding earmarked for emergency management equipment. Here, the funding goes to larger communities or agencies first with the intent that surplus

funds or older equipment will find its way down to smaller, rural communities. According to participants, this never happened, leaving rural communities without funding or equipment they were supposed to receive. Further problematizing this trickle-down issue is the technological gap between larger communities/agencies that received funding and those that did not. This technological lag left rural communities further removed and disconnected:

> We need 800 megahertz radios which only [the only agency] that got them is the highway patrol. When the government put them out, they sent them all to the highway patrol and highway patrol said, "We're going to trickle them down to the smaller agencies." Only problem is, the trickle-down got cut off and it never got to the smaller agencies, so that presents a communication problem between us, the highway patrol, the feds, and the locals. There's no one frequency that everybody's equipped to get on with and communicate with (LMASFC).

Overwhelmingly, participants mentioned the lack of outside funds available to them and their communities due to the processes described above. Where there are available pathways to funding, many communities lack the knowledge, time, or personnel to apply for grants or low interest loans offered by some federal agencies and programs. Some respondents commented that their lack of financial resources further inhibit their ability to procure funding from the federal government. Here a Fire Chief personified FEMA's position on contingent funding:

> "You gotta do one more training to meet the standard that we're not going to pay for. We're not going to provide it for free, but you've gotta have it. If you don't do this, we're not going to give you no grant money" (DGFCANT).

While some participants were angered by the dynamics of rural neglect in favor of funding larger communities, many were resigned to this reality. Most participants perceived state and federal government as being inefficient, wasteful, or negligent in their

distribution of funds. They communicated this perception as an expectation rather than a frustration or disappointment. In fact, many took pride their ability to fulfill their duty to their community despite these financial challenges:

> Without assistance from state and federal government, we're kind of in a hole that we can't crawl out of. So it's, it's going to be a mess. But, it's one of those deals, you keep trying. That's all you can do. A person, that's all they can do, just keep trying, and do the best with what you've got (SMEMCL).

4.5.2 Financial Capital – local revenue

Infrequent and sparse financial assistance from outside agencies at the state and federal level for preparedness, response, and mitigation combined with an oft-convoluted process for financial relief from hazard events after they occur, require communities to depend heavily on local revenue sources. Participants from both regions consistently mentioned budget constraints and limited operating costs as barriers for emergency management services.

> living in a small community, the biggest barrier is resources. [We] have a police department that is mainly volunteer, our emergency management system that are probably people that go home at 5:00 and it's just because we don't have the resources or the money to employ emergency management people in the evenings and at night and during the day things are pretty good but anything happens after 8/9:00, then those type of resources, we don't have those that they would have in a larger town (JBSBSFC).

> Respondent 2: I would think funds [are our biggest challenge], financially. We're a small town, we're not like Oklahoma City where we have all of our income coming in.
> Respondent 1: We don't have the tax revenue that other cities have.
> Respondent 2: Yeah. Pretty much anything special we get is from a grant or a donation (TCCCJSFC).

Commentary on limited budgets found in small communities is almost always connected to the perception that larger communities or urban spaces have greater access to financial

capital. When respondents elaborated as to why their communities had relatively little financial resources and tight budgets, they pointed toward their tax base. As discussed in the historical content section, most communities are reliant upon locally generated tax dollars to fund emergency management, law enforcement, and medical services. Other sources of revenue are provided through fundraisers and individual donations. An emergency manager in Kiamichi details the challenges associated with this approach—and reliance on donations from individuals—and the implications this holds for small, rural communities:

> [M]ost people down here live on fixed incomes. They don't have spare money hardly at all… If they do, it's very little. So, it's hard to pull money out of this community, and it's really hard. There's a few, you know, better off people in this part of the world, and a few younger people, like myself, who've lived here, that are willing to contribute to try to make the town a better place, but, for every one of us, there's 50 more that can't. That don't have the means. So, I mean, you figure ... that odds, you're not going to get very far. And when you have to provide for 50 people off the one person's contribution? Next to impossible… That's what we're up against here (SMEMBJG).

Drawing revenue from a majority elderly population on fixed incomes has a two-fold effect on vulnerability. Beyond a decreased income pool to draw from there are also regulatory concerns. Due to specific regulations, the state requires emergency medical personnel to have a certification and training requirement. This in turn raises the cost of operation of an ambulance, a cost that some communities cannot bear:

> We don't have an ambulance here. We lost our ambulance. Two times… The city had one, it went broke… …gave all the money away that they had to pay their employees and operating expenses, and all that stuff. Then we had Pafford EMS in here, and they pulled out because they couldn't make any money. They didn't get enough calls (SMEMBJG).

Not having a local ambulance poses an enormous problem for a community with a large population of elderly folks. Multiple communities explained this as a huge point of

contention and frustration in Kiamichi. As one emergency manager explained, extending the response time from 10 minutes to nearly an hour not only has severe health consequences for residents, but also makes moving into the area (which would potentially improve the financial situation for these communities) prohibitive. These specific grievances were not articulated in detail by Washita participants but overall frustration or resignation to a lack of financial capital was prominent in both regions.

Many in Kiamichi discussed possible solutions to help remedy their lean budgets for emergency management. Some suggested a registration fee for all-terrain vehicles to be road legal, patterned after measures other states employ to generate revenue. Given the apparent prevalence of these vehicles in the region this initiative would likely create a new, consistent source of revenue for communities. Others suggested a raising the utility tax, releasing an "ad valorem" tax or other small incremental public financing options. One respondent suggested making government held land around some of the lakes available for residential development to encourage homebuilders to move into the area. Most participants who offered solutions felt frustrated in that they had little access to decision- makers who had the political ability to create change in policy.

With few finances to allocate toward preparedness, rural communities need to be exceptionally creative and innovative in how they invest these funds. For residents in Washita, this means when funding comes available for new projects, they ensure that construction serves multiple functions, including preparedness:

> [So], we are building a new building, let's get the biggest bang for our buck if we are going to build this. Let's make sure we add some safety to it. It's not only for tornadoes, it's safety for intruders, things like that…there was a lot of thinking going into it. It was definitely a big selling point that "hey… we're going to build this safe room that's going to

> protect our kids, protect the community, open to the community, definitely help out with things" (JBSBSFC).

Another example of this ingenuity occurred at a primary school in Washita. Administrators repurposed buses to help evacuate residents caught in a large flood in 2011. Additionally, the storm shelters at the school were built to accommodate the entire town, not just the student population. Emergency management in Kiamichi demonstrated an equally innovative and frugal approach to storm shelters that they borrowed from another community in Northwest Oklahoma:

> Big metal boxes, Woodward, they got three of those boxes and got it approved through the fire Marshall's office and an architect out of Kansas and they built a shelter for schools. They went in and reinforced those things, they're 40 foot long, 8 foot wide, put a burn on it, 24-foot burn and there's 73 kids per container. They put 3 containers together, their total cost for the project was $25,000 and FEMA was $250,000 to put one in of theirs. The school and the county commissioner got together and built this for the school out there. It's really quite a deal (PCHEMBJG).

Creative solutions to solving financial problems are not only employed to improve equipment or infrastructure. The support of local banking institutions has had a dramatic impact on protecting individuals, families, and communities from loss in Washita as this bank executive explained:

> We do part from the bank side of it, we do actually have to make a little more provision for loss. That's something new that we began to figure in is actually doing a qualitative check in our loan loss evaluation. We are actually putting in a little factor for crop prices disaster… Usually we look at our loss historic[ally], but now we are heading to do a little planning on that from the bank side for these extreme conditions so that we can protect our investors and our stockholders and our customers. From that standpoint, we had had to increase our reserve for loan loss in a small way. It's not a large deal, but we are starting to have to do some factoring for that here within the constraints of the bank… We've historically been very benevolent in working with our customers to give them an opportunity to make a recovery from a bad year or bad two years. Working with them, it's been very good here at the bank. That's been our philosophy and we've got the capital to back it up and be a little more lenient than some

> institutions can be. Being the local community bank, it really gives us flexibility to work with our borrowers that a lot of commercial banks, corporate banks don't have. They just aren't structured that way (MSPBFC).

During this conversation the bank executive elaborated on the specific drought conditions that had affected the area in the past several years and how the economic consequences put additional strain on a community predominantly reliant on agricultural production. As he explained above, the flexibility their local bank offers is partially due to its independence from larger financial institutions; it is also a result of the personal relationships they have with members of the community. These social dynamics precipitate a banking policy that shoulders more risk and a larger financial burden in order to keep struggling members of the community afloat.

While the community bank in Washita helps members in southwest Oklahoma navigate challenges associated with natural hazard events, another innovative program in Kiamichi is designed to leverage community banking financial power to help the younger generation build a business and a future in cattle ranching—an industry that is in decline according to participants:

> And so all they're doing is buying cattle and so our program is here, it's about taking $200,000 and they run two sets of cattle a year on rented land. And they made $50,000 a year. And so they make $50,000 to the bottom line, to the back pocket. And so that's not a bad gig. And then how they take that money and move forward with it, that's up to them. That's their entrepreneurship, how to go forward. And it's working. We probably had 15, 20 kids, they're on their way. They're borrowing monies… $200,000, $300,000 and they're making money…
> *Interviewer: Wow. How do you get those kids there, not having two or three years of financials and things like that? That barrier?*
> One, we're working with the lenders. We start them initially, First United. A little bit bigger bank out of Holdenville. The USDA had a program called a Micro Loan. $50,000. Essentially a page and a half app, you get a mentorship, get a mentor and it was a micro loan trying to get people in various forms of agriculture. But we start you there. So, they had no

> equity, no anything. Our goal here at the college is don't let them get in over their head...it is very important for us that they be successful. And the worst-case scenario is they don't make money. Not that you owe $50,000 at the end… The ability to sustain yourself through business, a project or whatever is resilience to me. [W]e're going to have a cattle operation here next year or the year after. And if it is not profitable, I don't care how resilient you are, it'll fold up with you at some point down the road. The bankers will quit you and everybody's going to quit you and I don't care how tough and mean you are. You're just not going to make it. So, we've gotta focus more on profitability with young people in agriculture. I mean that's what drives people into this deal and so it's, for me, they gotta find that profitability. And then it's a whole lot easier if you're making some money to be resilient and stick with it in the business and whatever you're doing, the endeavor is sustainable… And it's also easier to, once you're profitable, is to identify areas that need improvement (ESEOUBJG).

This creative use of community relationships and financial institutions accomplishes several things. First, it provides a pathway for the next generation to get involved in an industry which requires a lot of initial capital investment. Second, it inspires interest within the younger generation toward industries that are generally in decline. Third, entrepreneurship should increase the wealth of the region overall, leading to an improved revenue stream for communities—revenue that can be used for things like preparedness, mitigation, and response. Last, and perhaps most importantly, it keeps the younger generation local, preventing the outmigration of educated young people. Many participants explained this outmigration as a deep and growing concern for the Kiamichi region, a fear which leaves the future of their communities in doubt.

One of the most striking differences in financial capital between the Washita and Kiamichi regions was the involvement of tribal organizations. Washita interviewees never mentioned the involvement of local tribal nations in the economic production, relief, or support for the community. In fact, one respondent commented that when tribal fire departments ask for the assistance of other local fire departments, they do so under

the provision that the tribes will pay for that assistance. However, interviews in Kiamichi consistently referenced the importance and support that the Choctaw Nation provides communities across the region. Financial assistance from the Choctaw Nation is diverse and generous according to participants. Many talked about a few situations where bottled water was shipped into the region after a tornado or flood. Others spoke about the invaluable assistance provided by the Choctaw Nations Emergency Operations Center (EOC). The EOC is a mobile command center that can be deployed anywhere in the region to coordinate search and rescue operations after a hazard event and is the only such unit in the region, according to interviews. Another respondent described tribal contributions toward a variety of community projects including navigating an audit and infrastructure improvements:

> [The Choctaw Nation] can't help you with payroll, stuff like that. But the streets in town they first started, they give $240,000 to be paved… Then we're still doing water lines in phases. We done phase one, new water tower and some lines, [The Choctaw Nation] said you get a grant for $800,000 and we'll match it. So we got the grant and they gave us $800,000… And then now here not too long ago, we was behind in our audits. They helped us get the audits, they paid $10,000 for the audits to be brought up to date… So they'll help you, the communities. They just can't give you money just to be giving it to you, but if you have a project going on, they'll help with that project if they can (MHCWSBJG).

4.5.3 Financial Capital – the privatization and individualization of disaster resilience

Reliance on small local revenue streams and the creativity to navigate those challenges for communities with little to draw from introduces the final trend in financial capital: the privatization/individualization of mitigation, preparedness, response, and recovery efforts. Earlier in this section, respondents mentioned that when the ratio of insured individuals reaches a particular threshold, that community is no longer eligible

for aid. Implicitly, this forces community members to secure private insurance to hedge against this vulnerability. Overwhelmingly, interviewees in both regions mentioned insurance as their primary strategy for resilience:

> Our main mitigation factor is our insurance. Everything from crop insurance to cattle insurance… we do have insurances for wildfire, drought and tornadoes, those sorts of things… In fact, we have a drought plan in place right now. [I]t's a federal drought insurance program. Just like a crop insurance program. And you can buy insurance for two-month intervals. (ESEOUBJG).

However, insurance is not a fix-all. Many respondents who do hold insurance for protection from property damage, income protection, and crop/cattle loss, explained the limitations in these policies. Participants talked about the expense of certain types of insurance. Given most study participants admitted that they had little disposal income, some forms of insurance become cost prohibitive. Interviewees often commented about their individual risk analysis and decision-making. Some might insure only the most valuable members of their herd (such as sows for breeding calves or show horses) while others elected not to insure a few of their most valuable livestock in favor of insuring a larger number of them. Respondents described choices to not purchase earthquake insurance, policies that cover ice damage, or even flood insurance because the expense is too high or their estimation of the likelihood of needing it is too low.

The next most common individual strategy was economic diversification. According to participants in both regions, farmers rarely rely on one crop and ranchers rarely only rely on their cattle for income, as this respondent explained:

> Most of our guys have been diversified anyway. We don't have many people that are just wheat. We don't have many people that are just cotton. They'll have cotton, wheat and soybeans so you don't get caught completely in one area. A lot of them will have cattle on the side, just kind of keep things going (MSPBFC).

In Washita, this strategy is echoed by the local bank mentioned earlier. They not only encourage their customers to diversify their sources of income but also encourage them to invest in agricultural tactics that conserve water such as "no-till" agriculture. This method preserves more of the moisture below the soil's surface by not breaking ground, thus requiring less surface irrigation (which was not only considered wasteful but costly). Ultimately, participants suggested that techniques like these prove vital in an area affected by an abnormally long drought, which was the case when this interview data was collected.

Communities in both regions rely on the financial support of other community members to get by. Many described making personal purchases for expensive yet necessary items or equipment beyond their department's budget:

> I paid for the RadarScope out of my pocket, to be able to use it, and I put it on his phone to be able to use it, and that's the only way we have of telling anything except for Weather Underground, and [that program is] pretty, pretty dicey (SMEMCL).

Other examples include donations from local business owners to help with the deficiencies or gaps in emergency management funding or equipment as this emergency manager recalls regarding a lack of available water to fight a structural fire:

> [A company that] haul[s] the wastewater from the disposal sites and whatever. So they can bring us water. They brought us out a tank full of water. Luckily, one of the big wigs for that company is also my fire chief for another fire department. He pulled up and I said "how much is that going to cost me and who's going to pay for it?" He said "it's not going to cost you anything" (PMEMSBJG).

Interviews from both regions were saturated with stories of individual and community contributions. Several respondents described regular bake sales sponsored and conducted by the communities in both regions, high school fund raisers for a sheriff's department in

Kiamichi, children volunteering for cleanup after a flood in Washita, and countless others. In Kiamichi, one citizen lent their personal truck to the sheriff's department so they could respond to a fire on a mountain—terrain that their issued vehicles could not traverse. A local hardware store allowed local law enforcement to use their generators and set up a command center in the store parking lot when the police station lost power after a severe thunderstorm.

4.5.4 Financial capital summary

Overall, financial capital can be summarized by two main themes—a lack of external funding and inability to generate local revenue. "Trickle-down" distribution strategies do not benefit rural communities. Procedurally, brand new technologies and equipment are allocated to larger agencies which are supposed to repurpose their old equipment and send it to smaller agencies. Not only does this arrangement inherently privilege urban communities while deprioritizing the urgent needs of rural communities, many respondents suggested that they receive no resources at all.

A lack of diverse economies in Washita and Kiamichi, dominated by secondary labor markets, gives local communities little to draw on for fiscal budgets. Demographic trends indicating a rise in elderly populations are indicative of a trend in which younger generations are migrating out of these areas to pursue better educational and employment opportunities while older folks move into these areas to retire (often on fixed incomes according to participants). Additionally, strict legislative constraints on raising existing taxes gives small rural communities few options to generate additional revenue.

Despite these challenges, communities fund innovative ways to navigate limitations to financial capital. Communities routinely hold fundraisers for families effected by hazards and emergency management in need of funds. Additionally, volunteerism was perhaps the most widespread community initiative to navigate lean budgets. As detailed in the section on cultural capital, volunteerism is a culture in these communities. Specifically, the relationship between financial capital and cultural capital is clear: volunteering is necessary in large part because of the lack of financial resources that allow for paid positions in law enforcement, fire departments, search and rescue teams, storm spotters, and other emergency management positions. The next section discusses interviewee perceptions of infrastructure, equipment, and other physical resource which I refer to as Built Capital.

4.6 Built Capital

> Built capital is the permanent physical installations and facilities… [including] roads, streets and bridges, airports and railroads, electric and natural gas utility systems, water supply systems, police and fire-protection facilities, wastewater treatment and waste-disposal facilities, telephone and fiber-optic networks and other communications facilities, schools, hospitals, and other public and commercial buildings, as well as playgrounds and soccer fields (Flora and Flora 2014:213-214).

This permanent infrastructure can be further categorized along two key dimensions: access and consumption. In other words, whether infrastructure systems are privatized or publicly funded and/or managed affects the degree to which a community can access and/or utilize these features.

In the context of disaster, the durability of these infrastructure systems to withstand, cope with, and recover from environmental stressors is key to the community

resilience. Built capital and the resilience of key infrastructure systems during and after a crisis are key to maintaining community health. To this end, superficially separate infrastructure systems are often tightly coupled and integrated. For example, quality communication and early warning systems help emergency management agencies to quickly disseminate information about hazard events and coordinate public actions such as to take shelter or evacuate an area. Integrated and diverse road networks allow community members to evacuate effectively before a hazard event strikes and allow emergency management services to quickly reach those in danger and transport them to medical facilities if necessary. Electric facilities power those hospitals and allow them to function. Additionally, the power grid ensures those isolated after a hazard event have potable water, energy for cooking, heating, cooling, and to power medical technologies like dialysis and ventilators if emergency services cannot reach them for a period of time.

In this study, interviews often gravitated toward access and utilization of less permanent features, broadly classified as "equipment" by respondents. However, equipment as a distinct analytic category does not fit neatly within any form of capital as defined by the CCF. Equipment, defined by interviewees as ambulances, police cruisers, fire trucks and water tankers, mobile Emergency Operations Centers (EOCs), chainsaws, radios, mobile phones, internet access, and even clothing and boots were discussed as crucial for these communities. The theoretical and practical implications of this addendum to the conceptualization of built capital will be addressed in the following chapter.

For community members, there were two main emergent sub-themes nested under built capital and related community vulnerability and resilience: equipment and

infrastructure systems. Interviewees talked about these two dimensions of built capital in terms of availability, access, quality, and quantity.

4.6.1 Built Capital – lack of equipment

Early warning systems were a particular area of concern for emergency management agencies. Emergency managers in the southwestern region of Washita mentioned recent upgrades to their public notification system that warns the public when tornadic activity threatens the community:

> …one of the deals that was in our heads of mitigation plan the last time was to update our outdoor notification system, or basically our storm sirens. That was in progress before I took the job in 2011, and in January of last year [2016], we finally worked through the process where we replaced all of the storm sirens here in the city. One of the other deals would be a mass notification system and we implemented that back in February, March [2017]. We have a mass notification [system]. Those were the two big deals that we have implemented in the last year, just here in Anadarko. Also, I can speak for the county, for Cobb Lake, which is just North of Fort Cobb. Our old storm sirens, we basically surplussed them out, and give them to the county. Then the county is in the process of taking the old storm sirens that we had, and putting them into some areas, especially out around the lake, that didn't have any outdoor warning systems (SWAEMFC).

Here, this emergency manager refers to the "trickle down" system highlighted previously in the section detailing financial capital. According to respondents, as larger communities upgrade their early warning systems, the replaced, older equipment is supposed to be repurposed in smaller communities. Based on the interview data, it is unclear if other towns in the Washita region have received (or are scheduled to receive) these sirens. However, several other interviewees from smaller communities in this region continue to cite their early warning systems as cause for concern:

> weather alert systems would help, although television does a pretty good job. Any type of large system would definitely be helpful for us...in more of the tornado area. We have fire alarms, things like that but we have a pretty good messaging system but definitely weather alert type stuff (JBSBSFC).

It is clear that several communities in the Kiamichi region in the southeastern part of the state, have a definite need for an upgraded or expanded early warning system. Many respondents living in this region discussed the challenges posed by a derelict and outdated public early warning system:

> our storm siren, tornado siren, is outdated. I mean, it's antique. You can hear it for about two blocks, is all you can hear it. So, the police officers and, I've been trying to get the fire department to drive around with their lights and sirens on so people can get some notification, because you can't hear the sirens. I mean the town is stretched out so far. The siren's right there at the PD (SMEMCL).
> I think we have one, but Wilburton's a small town. They can hear it. Then that's the other thing, there's nothing for rural, the outlying rural areas. You can't hear the tornado siren 20 miles down the road (BSNPTAL).

The latter quote highlights the distinct challenges that rural communities need to navigate that emergency management agencies in urban areas do not: the remote spatial dispersion of residents. Conventional approaches to early warning systems originally developed in urban spaces with high population densities are inappropriate or largely ineffectual for rural communities. Combined with the "trickle down" funding system implemented at higher levels, rural communities need to develop innovative solutions to work around the challenges introduced by a widely dispersed population and a hierarchic and bureaucratic system for distributing critical material resources:

> And as soon as we get notification or warning of an extreme weather event, like if there's a tornado we actually go out and drive around throughout the community with our sirens on to try and give some sort of early warning or notice because we don't have… we've got one siren here in town and it doesn't carry very far. Right now people, and depending on where the wind blows, that's an actual factor, people can't probably [hear

> the sirens beyond] a three block radius. We have 1.7 square miles, that's our town map… so now we basically are just, we assess and do what we can. And if we get a tornado warning, like he said, we're out in our patrol cars riding around with our sirens on (DJPOLCL).

Interestingly, a few interviews discussed how the leadership structure within a community can further problematize this situation. When the authority to notify the public rests with an individual without the training, expertise, and will to initiate a warning, public trust and confidence in leadership and those systems wavers:

> I've got one or two people that I can depend on. One of them is my wife. She's a certified storm spotter. I've got a friend of mine that's a certified storm spotter, and me. The [redacted—job title] thinks he is because he went to that little NWS [National Weather Service] school that they put on, where you go in and sit down and watch the films. You don't even take a test or anything. You don't get no certification card, no nothing ... And he thinks he's a certified storm spotter. I told him, I said, "Buddy? You go do all the stuff that I've done. You go through all the education, and all the testing and all that stuff that I've done, and then come talk to me." I said, "Because you don't know your butt from a hole in the ground" (SMEMCL).

Social dimensions which specifically focus on training and knowledge, community trust, and access to decision- makers will be addressed in later sections of human, social, and political capital.

Many respondents in both Kiamichi and Washita regions discussed how equipment of varying quantity and quality dramatically affects their ability to respond to a crisis once a natural hazard event occurs in their communities. Vehicles were a profound focus for rural emergency management. Interviewees in Washita talked about the drastic improvement in emergency management response brought on by investment in new vehicles capable of traversing some of the wide-open spaces in rural counties in southwestern Oklahoma:

> Ten years ago, this department didn't have a single four-wheel drive vehicle. We drove Crown Vic's for patrol cars and no deputies had pickups, anything like that for patrol. Now, every vehicle that we own, which will be about twenty or so, maybe one or two more than that, are all four-wheel drive. One is because of the sand in the county and the other is because of the snow and ice, mostly ice. (LMASFC).

The variety of the terrain, from small, rocky mountains to open sandy plains, makes a four-wheel drive vehicle a necessity for emergency management in Washita. The communities in Kiamichi have a different set of challenges based on the natural landscape. Kiamichi receives more rain on average than does Washita. The southeastern part of the state is also densely wooded and has more drastic elevation changes overall than does the southwestern part of the state. As mentioned in the Natural Capital section, this terrain inhibits their ability to communicate and coordinate with walk-talkies or radios that require line of sight. However, these natural features also create challenges for emergency management. Reaching people in peril becomes a logistical issue. The location of specific hazard events could (and does) inhibit situational awareness and increase the time it takes to respond:

> …we went 16.6 miles up the mountain. And we had to leave our cars behind 'cause they just couldn't make it up there… And one of the Deputies has a truck so we had to jump into his truck to get all the way up to the top. And there was just a few kids partying for graduation that let their fire get out of control and it burned several acres… you know we're trying to get fundings for trucks because our Crown Vic's just can't go 16.6 miles up the mountain (JGUSANT).

Again, this quote demonstrates the creative solutions employed by emergency management to solve routine problems presented by lack of quality equipment. This interview went on to discuss equipment lacking quantity or quality as the primary barrier to fulfilling their duties:

> Equipment [is the biggest barrier]. Yeah. [T]he high school is trying to raise money for us for vests. But you know, some of the gear that we have, like some of our cars don't have sirens. But some of the emergency management stuff. Like we have one chain saw and it got stolen… Most of the stuff that we have, each individual deputy has bought themselves to help support the agency. Which we don't mind because we're trying, we support him 100%. But it would be nice to be able to have some type of little emergency management trailer to pull, so that we have something (JGUSANT).

Response time is a focus of emergency management. Without proper vehicles, local emergency management must sometimes rely on their neighboring communities to respond in their stead, vastly extending the time to reach people in danger. Even when quality vehicles and equipment are available, interviewees were keenly aware of the dangers that emergency management inherently poses to those material assets. In Washita, respondents talked specifically about the risks to equipment when rushing to respond to wildfires and the potential impact that realizing those risks may have on their ability to carry out their future responsibilities:

> Respondent 1: I mean some of the volunteer fire departments are pretty thin on equipment and people. If something goes down, we may have a fire department with one truck or without a tanker or ... What was it? Oney got two [trucks] taken out a one time.
> Respondent 2: Twin Cities. They were on a fire at Binger this past year and they were in a vehicle accident and they lost 2 brush trucks in a vehicle accident so they were out of service for months. That hits hard because that little community needs them because then the response time is slow for the next department to come over and help them (BOVFLGFC).

Relying on community members—who not only donate their time (as presented in "Cultural Capital" as the culture of volunteerism in rural Oklahoma) but also their personal material resources—is a key dimension of cultivating resilience in rural communities. As this narrative suggests, communities find other ways to navigate their

lack of equipment by adapting and utilizing unconventional equipment not originally intended for emergency management:

> My [fire] truck is a 2,500-gallon tank, and it's an old fuel tank put on a military truck. It works. I'm very happy with it, but I'd much rather have [town name] 3,000 gallon one. He can back up to a pond, hit the button, and he can suck the water out so fast it makes it swirl like a toilet. When he pulls up to empty his water, instead of draining it out of the tank, he hits the air compressor and blows it out. It takes him about a minute to dump it. It is a fire tanker. It's 3,000 gallons. It's twice the piece of equipment that I have (DGFCANT).

This community in the Kiamichi watershed was able to solve a problem by repurposing a military truck to carry water to structural and wild fires but was cognizant of the limitations of this strategy. This interviewee insisted on the critical nature of this adaptive capacity in rural spaces, as a highly integrated and comprehensive water system is unavailable to residents who live far from water distribution networks:

> You've gotta realize if I have house fire outside of city limits, every drop of water I put on that I have to take to it. Okay, well, it may take 40,000 gallons of water to put the fire out, so I don't carry that. I shuttle it. We set up, we drop down these drop tanks. My tanker backs up, dumps water in it and goes and gets another load. He goes back and forth. All these trucks are hauling water all the time (DGFCANT).

A similar issue was described in Washita. There, specifically designated water tankers are available to distribute potable water if water lines break or become disrupted during a hazard event. However, the water tankers, or "buffalos," are inoperable as this director of the water treatment facility described:

> I got told that we have water buffalos. Okay… I got told they're on semis, the tires are flat, we don't know if they leak, so I'm like "make sure they're doing their job so that I can do my job." In every single meeting I ask the same question: "So did we get the tires fixed on the water buffalo somewhere?" That part of it, I guess you can ask the questions, but there's nobody saying get those tires fixed. I don't know whose place it is to do that. We really, as far as I know, don't have anybody regulating our locals to make sure that they are doing what they need to do so that we can do

> our job. Yes, I can tell you that if I was to run out of water, I got water buffaloes over here. Then I'm going to have to turn around and tell you, "But in a natural disaster, really are you going to be changing the tires? (KBWTFC).

In both regions, generators were frequently discussed as an emergency management need. While some communities did provide generators for emergency management agencies, most talked about the inadequacy of these resources. Many communities had none. Some did not have the capacity to supply enough power should service be disrupted:

> The last time we needed a generator, I had to wait for it to come out of Oklahoma City, which took us about 4 hours to get it here. It's not a 4-hour drive, but the time they find someone to pick it up and then get it down or to another place and transferring it and everything, it just takes time down here to get stuff going down in here (TCCCJSFC).
> Cell phones went down, we had no way of communicating to nobody. We made our calls, we got people in an area. In this situation we had to use the Choctaw Country Store here, because they have generators. That store was lit up and operational and everything. We used their parking lot as our command center and got through it (DJPOLCL).

For communities that deal with a lack of equipment (quality or quantity), a cumbersome bureaucratic structure that is difficult to navigate and inhibits the ability of communities to respond to a crisis. Subsequently, interviews in both regions talked about the generosity of community members and private businesses in lending or donating their own generators to emergency management.

4.6.2 Built Capital – protecting critical infrastructure

Lacking equipment of proper quality, not having enough, or none at all puts an enormous strain on maintaining critical infrastructure. Interviewees in both regions talked about the importance of clearing roads for emergency responders to be able to reach those in peril

after an event. Due to their remote location, the quality of roadway systems varies significantly as one gets further from city or town centers and long private drives to residences become more prevalent. Clearing roads is also crucial for evacuation or to relocate if their home is made unsafe or isolated after a hazard event. Ensuring the integrity of these thoroughfares is also tied to energy grids that deliver power to communities. In response, both regions seem to dedicate an immense amount of routine maintenance, energy, and personnel to preserving infrastructure systems. According to participants, natural hazards such as high winds and ice storms pose a significant threat to the integrity of their power infrastructure. While high winds may be concentrated in a relatively small area, ice storms pose a much broader threat to the entire area. When ice accumulates on trees, they can collapse often causing widespread power failures. Specifically, a majority of interviews discussed the strategic importance of routine trimming and clearing of trees that threaten powerlines:

> …two years ago we had an ice storm and it took us about three or four months to pick up everything we had in town. And that was a small ice storm. It wasn't very big. And that's, you know, it'd help to have resources (RGECFC).
> The ice is a major concern down here. Not so much snow, we don't get that much snow, but the ice, when it comes, I know that ... Many years ago, we had the big ice storm come down through here, and everybody around lost power for several days. [Now] the electric companies have had the tree-cutting guys come. I see them like every year. They come and check things out, so they really try to keep the trees cut back (BSNPTAL).

Severing the flow of power to individuals and communities is often coupled with the disruption of communications. Maintaining the integrity of communications systems was the most important and prominent talking point for interviewees: “when something major happens, communications always seem to be a problem (JWEMBJG).” Communities in the Washita and Kiamichi lauded their new 911 system.

> Dispatch was ran through the Caddo County Sheriff's office. Then when 911 was implemented, they had to have a separate dispatch so we could answer 911 calls and be 911. So it's enhanced. So it plots on our map and stuff. That's basically why we're new (BOVFLGFC).

Here, a dedicated call center integrated with all emergency management agencies in the area helps first responders to communicate and coordinate operations. When combined with GPS mapping, agencies are able to locate individual's mobile devices for search and rescue operations. These new technologies are critical for emergency management, as the devastation caused by some natural hazards such as tornados, straight-line winds, and widespread flooding may make physical landscapes unrecognizable. With no road signs, few landmarks, and collapsed buildings reshaping the local scenery, residents who have lived in their community for decades may become disoriented. GPS technologies allow first responders to pinpoint exactly where they are needed—these lessons were learned from other communities' experiences with devastating natural hazard events:

> Respondent 1: We had people come in and spoke to us about [the] Joplin tornado, what went wrong there and what we do because you lose your street signs, you lose all of your landmarks, you don't even know where you're at. If you're a policeman after 30 years, you don't know one street from another. What we did, in Joplin they had people trapped in storm shelters by debris, nobody recognized the streets, or the blocks, or the houses or nothing.
> Respondent 2: They were in the shelter with debris on top of them, wasn't no texting, wasn't no cell phones at that time. There was no communication. What we've decided on our 911 map now, when they call to get a 911 address if they have a storm shelter, I want to know where it is in reference to the house, southwest corner, and on a 911 map that house is indicated with a different color so we know there's a shelter at that house. If there's a disaster we know to go look in the shelter. We've learned from that, we've learned a lot from other people's disasters to make things better here (PCHEMBJG).

New meteorological infrastructure was noted by several respondents in both regions. In Washita, interviewees mentioned the recent construction of a radio antenna on Indian

City Hill. This antenna is part of a larger, integrated communications network across the state called "Mutual Eight." The construction of these new radio towers helps eliminate blind spots where first responder units would "go dark" and lose contact with central command. According to participants, integrating communications such as the Mutual Eight and the OLETS (Oklahoma Law Enforcement Telecommunications System) has greatly improved coordination and communication efforts between emergency management agencies and personnel. Overall, emergency management was focused on the development and use of mobile applications to stay informed:

> For severe weather, we use RadarScope and Weather Underground. We depend a lot on Push County One Call. They will notify us if they've sent their spotters out, and let us know before it ever gets to us. Because, a lot of times, it comes from Antlers this way. So, they let us know when it's coming this way by One Call, which is just basically a pager on the telephone (SMEMCL).

Holistically, due to more detailed weather reports, better radar technologies, and mobile phone access to this information, interviewees remarked about the overall improved quality of communications between emergency management agencies as well as to the public.

Relying on new technologies, such as the availability, access, and utilization of the internet, has quickly became a focal point for disseminating information to rural communities. The prolific development of wireless internet and mobile devices has provided a new, relatively low-cost platform for the public to stay informed regarding weather developments and emergency communications. Emergency management proactively engages in social media to enhance public awareness:

> I think social media also. I think the Facebook, or whatever other social media there is out there. I'm not familiar with all of it. I'm an old timer. I think that has a lot, and with the apps, the news apps, weather apps, people

> get more alerts, and I think that's helped bring more awareness about the weather (JWEMBJG).

However, this tactic of direct engagement and interaction with the public has significant limitations. Folks in Kiamichi commented on the lack of infrastructure to provide reliable internet access—especially during a crisis that could render what internet access they do have unusable—in the southeastern part of the state:

> Just knowing what's going on sometimes. Down in this area, there's a lot of elderly people and they don't have internet, and when [the] internet goes down because of the storms, because you have so much down in the rural areas, it's just…you're just kind of flying blind sometimes (BSNPTAL).

This interviewee went on to comment on the generational gap. Specifically, elderly residents might be less able or willing to utilize these technologies. This also inhibits some of those most vulnerable from staying well informed:

> Communication sometimes would be a nice thing if you could figure out how to communicate with people in a rural ... It's not like living in a big city, it could be 10 miles down the road is your next neighbor, and sometimes you don't have time to go check on them when the tornado's coming. I don't know how they do it, but communication would be the best thing. We do really well with what we've got, but when everything goes out, there's just ... (BSNPTAL).

Affirming prior analysis in this chapter, the remote nature of rurality makes investment in expensive infrastructure—such as water distribution networks, internet access, and quality road systems—cost prohibitive. Additionally, those unfamiliar or unwilling to engage with navigating the digital landscape may leave them blind to crucial information during a crisis. It may also leave first responders unable to find their location if the public does not have a GPS capable mobile device. Widespread internet access carries tremendous potential for emergency communication and coordination, but is offset by the fragility of those networks to damage and disruption, a current lack of

telecommunications infrastructure in rural spaces, an unstable or unreliable connection, and the specific knowledge required to utilize these technologies.

4.6.3 Built Capital - building new infrastructure

Plans to build new public infrastructure specifically designed to mitigate the effects of natural hazard events were rarely discussed by respondents. The little discourse that does deal with this directly came from mostly from those in Kiamichi, which detailed the advantages of a new water treatment facility that was built in the early 2010s. Many talked about improved water quality, distribution, and availability of water due to this new plant. However, this facility is privately owned and many of these interviews lamented over the intermediary and future cost of this infrastructure:

> The old plant was just dated and wasn't able to keep up. They've got a water plant now that I think they do very well. They're still paying for it and will be for the next 20 years, but it did help (DGFCANT).

Respondents in Washita did mention the construction of public storm shelters, but one interviewee discussed how building codes have not evolved to meet current or future hazard risk. The emerging threat of seismic activity in the southern high plains has created increased concern about the integrity of built capital. Additionally, private development of new housing in Washita is slated to begin in a 100-year flood plain. Plans for these new construction projects is vetted by an engineer and surveyor:

> We used to have where they could raise [the floodplain] no more than a foot. With our new ordinances that we've passed in 2011 that they can't raise it any. They have to get an engineer to basically determine the base flood elevation. If it's in an area that is not mapped. We have a lot of un-mapped area in Caddo County [so] if they're inside that 100-year flood zone or close to it then we do require an elevation certificate is filled out by an engineer or a surveyor… We haven't really done much with earthquakes around here. We've had them. We feel tremors every now and

> then. [But] I can't think of anything we've done right around here different to prepare for earthquakes (DLSDFC).

Many participants commented on the effects hazards have on critical infrastructure during a crisis. Widespread flooding in both regions impedes access, isolates whole towns, and makes responding to hazard events incredibly challenging:

> There are certain areas that do flood. They get to a certain point and cover the roads. We've had probably and again it was before this administration. The roads that flood surround the area. The major bridge down here towards the entrance of town will cover. And their building the bridge, they're fixing that bridge. And it mainly just blocks the town off (JGUSANT).

While specific public intentions and funding to develop new infrastructure to mitigate natural hazards was lacking, the desire to do so was articulated as necessary: "It requires creative solutions, and really these are ... They need to be engineered projects to help alleviate the problem" (BSACE). Despite the need for updated public engineered infrastructure, most of the new construction for preparedness and mitigation has been private. Insurance, as discussed previously, was the main strategy discussed in interviews to protect built capital. Secondarily, some individuals have built private storm shelters but these efforts are largely reactionary. Intergenerational knowledge (cultural capital) about the cyclical nature of weather cycles (which help construct perceptions of risk) largely inform current practices:

> Well, I remember being involved in tornadoes in 1957 when it rained I'd say 70 inches, I remember very well. I thought back, it had been 60 years, I was 10 years old and the 10th of April. My God, we had one that almost blew our house away, blew barns away. I remember it very well. Then in May of that same year, we had another tornado on Mother's Day. Then in August, when I went with my dad to the sale barn, in Idabel almost blew the sale barn away that day. In October of 1957, we built a storm cellar. When we sold calves that fall, we took part of the money and built a storm cellar. Tornadoes have always been, this is tornado alley and this is always

been something that you've got to be aware of and be prepared for (JEFSVAL).

Interestingly, this respondent referred to tornadic threat as an historical and perpetual part of the landscape in Oklahoma yet engaging with preparedness measures (such as building a storm shelter) required a specific, personal experience with that hazard in order to create the impetus necessary to act.

4.6.4 Built capital summary

Overall, built capital is largely viewed as equipment and less permanent material resources in communities. Recent, one time federal and state funding has permitted some emergency management agencies in the Washita and Kiamichi watersheds to update their vehicles and telecommunications networks. Implementing new 911 systems, GPS location, and integrative systems such as the OLETS have increased emergency management's capacity to coordinate with other agencies and communicate with the public. However, community members overwhelmingly discussed maintaining critical infrastructure such as roadways as their main mitigation strategy. Updated water distribution networks (in Washita) and the investment in a new water treatment plant (in Kiamichi) have alleviated some concerns related to water access and quality but have left these communities burdened with an immense financial liability, limiting their ability to invest in other engineered projects. Broadly, discussion of investment in new public infrastructure is absent in these regions. Subsequently, communities continue to find strength in one another through lending or donating equipment. Washita and Kiamichi regions also creatively adopt new technologies—such as mobile applications and social media—to stay informed and knowledgeable about natural hazard events. Despite these

efforts, the demographics of these regions as well spatial dimensions of rurality continue to present challenges for resilience in rural Oklahoma.

4.7 Human Capital

Human capital includes intangible individual attributes that contribute to individual and collective health, well-being, and growth in a community. This concept has developed as a key component for economists and social scientists. Dedicating resources to cultivating human capital are considered investments because "people cannot be separated from their knowledge, skills, health, or values in the way they can be separated from their financial and physical assets" (Becker 2002: para II.3.2). According to Schultz (1961), much of the economic development, growth, and overall increases in life expectancy and public health during the first half of the twentieth-century can be attributed to public investment in education.

Human capital is typically derived from cultural capital and is broadly considered by many economists and social scientists as a central driver of economic production and is therefore a crucial resource for community growth, livelihood, and sustainability. Human capital is also vital to disaster resilience. Education, training, and local knowledge are key aspects for perceiving risk, knowing what to do during a crisis, and—especially for emergency management—preparing for, responding to, and recovering from the effects of natural hazard events. Key emergent themes of human capital drawn from interviews conducted in the Kiamichi and Washita regions of Oklahoma include: (1) education, training, and knowledge; (2) inter-agency and public communication; (3) leadership; (4) personnel; and (5) public health. Overall, the rural public and emergency

management personnel and their communities are well trained and knowledgeable about hazard risk and response protocols. However, the populations of these regions consistently leave emergency management looking for able bodies to perform the essential duties required during a crisis. Trust in quality leadership is somewhat discursive—in some places changes in leadership have inspired a new faith in these key institutions; in others a lack of clear leadership priorities has caused fear and anxiety among community members. Despite this, respondents tended to be confident in their ability to coordinate and communicate with emergency management agencies (both in terms of scale and within/across communities—federal/state/local and fire/police/EMS, respectively). An increasing elderly population in these regions have specific health implications for these communities and require tailored planning by emergency management.

4.7.1 Human Capital – training, education, and knowledge

Several interviewees, from both regions, discussed state requirements for an emergency management or disaster plan—ensuring that all counties in the state have one. Many interviews in Kiamichi mentioned concerted community efforts to go beyond these minimum requirements. In fact, one interviewee talked about two specific plans in their community which serve different functions—response protocol and potential hazard mitigation. The former is a detailed, systematic "emergency operation plan" which outlines agency responsibilities and hierarchies of command, anticipatory deployment of personnel and resources, and a periodic training schedule for emergency management

leadership which filters down to an itinerary of training requirements for each agency. The latter mitigation plan is entirely different:

> Harris Mitigation—they [emergency management] ask the committee to approach the possibility and the probability of a disaster. Our probability of a hurricane here is very slim. Our probability of a tornado is very great. You have to analyze all of the disasters that could happen to you. Flooding, we have a big dam down here, Hugo Lake, if it's breached, we have to address all the problems that could [occur]... We try to get them on order on which one is possible and the one that's more probable and put them in order. The Harris Mitigation plan addresses those issues. The emergency operation plan says this is how were going to handle this (PCHEMSBJG).

This interviewee went on to explain the strategic importance of having community engagement with both plans. For the emergency operation plan, community members are given key insights at regular public forums which detail the coordinated response capabilities of each community. Meetings also help formulate public expectations for an emergency and advise the public on how they can prepare individually (e.g., how to prepare a "go bag"):

> But we try to teach people, talking about preparing, to get the brochures out. You can do it all day long but until it happens to them ... have the three-day supply of medicine and everything that you need to shelter in place for three days (PCHEMBJG).

Emergency management in this community collaboratively consults with the community regarding how to better manage resources and address gaps identified by community members. Feedback from the community is also encouraged through public input on the Harris Mitigation Plan, which helps leaders prioritize eligible projects for future development:

> We took the Harris Mitigation book and a lot of it was by accident, we completed a whole bunch of the projects that was voted on by the people in the county that was on the Harris Mitigation committee. We got the

> sirens, we got mass communications now for disasters and for emergencies through the Hyper-Reach (PCHEMBJG).

A secondary function of the Harris Mitigation Plan is to serve as a prerequisite for federal funding:

> McCurtain County don't [have a] hazard mitigation book. The commissioners didn't think it was necessary to allow the city schools to apply for a grant. They got turned down 'cause there was no hazard mitigation in the county. You can't even apply for a grant if you don't have a hazard mitigation in place. So they're busy down there now trying to get a hazards mitigation book (PCHEMBJG).

The mitigation plan uses historical trends and up-to-date meteorological and biophysical data to inform and justify community goals and priorities. Practically, the Harris Mitigation Plan serves as a veritable wish list of public infrastructure and other disaster preparedness needs collaboratively identified by experts and local community stakeholders. The existence of a mitigation plan also allows them access to available state and federal funding to (at least partially) subsidize those projects. A latent effect of these plans and the community-oriented design of preparedness is increased community confidence and faith in key social institutions and leadership in those institutions, as well as a ground-up approach to resilience. While the data only contained one interview that described such a detailed, ground-up, community oriented, data driven approach to emergency management, it provides a potential template of best practices for other communities.

According to nearly all interviews, training is a perceived strength for emergency management and their communities in both the Kiamichi and Washita regions. As mentioned in the analysis of cultural and financial capital, volunteerism is a key focus for disaster preparedness in rural communities in Oklahoma. The dimension of human

capital, as articulated by participants, demonstrates the competency and proficiency that these individuals have. Nearly all interviewees discussed how each volunteer "wears many hats" in their communities. Numerous respondents discussed being volunteer firefighters, search and rescue, tornado spotters, and emergency medical technicians (EMTs). Volunteers are highly trained in a variety of different skill sets and often continue their education to maintain their competency:

> We train a lot, we have a search and rescue team here that does well in search. It's not just our own department. We have some of the other departments that are involved in our search and rescue class and our search and rescue team. We actually have a couple of people that teach the Wildland Search and Rescue class. We teach for ourselves and OSU (DGFCANT).

Whether it be formal education (bachelor's or master's in emergency management related degrees) or certifications in meteorological/storm spotting, CPR (cardiopulmonary resuscitation) paramedic or EMT certifications, participants are confident in their expertise and that of their volunteers.

Not all knowledge in these places is formal. Local knowledge and experience play an important role in a holistic and community-oriented approach to disaster resilience for these communities. Consistent across all interviews are precise and intimate recollections of the effects different hazards have had in participants' communities. Because most respondents have lived in their communities for years or decades (if not their entire lives) they have a specialized understanding and knowledge about the local ecology and spaces they call home. Often, they would recall incredibly detailed stories and experiences which inform their current practice as emergency managers in their communities. In Washita, several participants seemed to have a sixth sense about the potential likelihood and probable location of wildfires, calling on their

volunteers in certain areas to be on "stand-by" on days or times of the year that meet a set of conditions that give emergency management a "feeling." In Kiamichi, respondents casually talked about alternative routes they had to take because they know when certain roadways will be flooded and impassable. Emergency management personnel in southeastern Oklahoma have informal routines of regularly contacting state forestry departments for updates on fire risk or reach out to the Army Corps of Engineers to check on water quality issues based on their lifetime experience with drought, wildfire, and flooding in that region. Storm spotters from both regions discuss their experience with radar blind spots and ways they navigate them.

Most respondents discussed the interesting challenges with accessing training and the benefits of partnerships with organizations that provide them at low or no cost. In Washita, organizations like the local technology center, OSU, and the OSFA (Oklahoma State Firefighters Association) provide essential training for emergency management and the public.

> I know the Caddo Technology Center at Fort Cobb is a good place. They have fire training. They'll offer different courses. I know that Oklahoma State Firefighters Association, they'll send out a list quarterly of different classes that you can take through OSU or through different technology centers around your area. We're all volunteers so we know we work 40, 50 hours a week and then ... Any extra is on you to take training basically. We've taken fire fighter practices and that's through OSU at the tech in Fort Cobb. You can take any kid of training that you want. I know OSFA, the Firefighters Association, they have a big list of different classes that you can take through different places (BOVFLGFC).

Not all respondents were fortunate enough to enjoy these offerings. In Kiamichi, several interviews talked about the financial burden that even minimally (state) required training imposes on volunteers:

> For what the state says that have to be, they're minimally qualified to do their job. I've got some friends that's water operators in other towns and stuff, and they're all the time, going to more classes and stuff. These out here aren't. They don't have the money to. You know, it's all about money. You know, if you don't have the money to pay for the classes, you can't go. So ... they're kind of caught between a rock and a hard place (SMEMCL).

Here, the regulatory barriers to staffing volunteers oblige individuals to take on a double financial penalty for their community engagement. The cost of being qualified to perform unpaid labor and service in their community. While yearly trainings are required for emergency management, these commitments are often reserved for emergency management personnel and volunteers. Human capital in the form of knowledge also contributes to disaster resilience. However, educational programs or classes available to the public can be expensive too. Some statewide programs are designed to shoulder this financial burden for communities. According to many, OSU extension helps bridge the gap between formal and informal education:

> …people need information on how to recover from drought or how to avoid problems with extreme weather, some of those things we could help with. We're not an emergency office… one of the things that as an extension educator we do, we help educate people on the half-set sales tax and how that would affect people. And what that did, it took us from 14 rural fire departments to 21 rural fire departments. When we got into the droughts in 2011 and '12, having all those extra fire departments had a huge impact on keeping fires down and keeping the county from burning up, so. There are other things that we affected from an education standpoint (DNOSUEFC).

Based on field notes taken after this latter interview recording concluded, the extension agent discussed some of their unofficial practices that add tremendous value to human capital in their communities. OSU extension services perform many tasks that fall outside of their official obligations. For example, informally OSU extension agents form community cooperatives of community stakeholders, emergency managers, and the

agriculture industry to help disseminate knowledge about best practices. When I inquired about why he did not talk about this during the interview, the extension agent responded, "because this isn't part of my job description or official position with OSU extension." These community cooperatives have the latent effect of being a place where knowledge is shared among stakeholders in the community, not just disseminated from OSU. However, as mentioned in the analysis of Financial Capital, OSU extension is experiencing budgetary cutbacks—reducing the effectiveness and reach of these extension agents. At the time of recording, this OSU extension agent was charged with serving two counties instead of one. Reducing their ability to actively engage with their communities during their work responsibilities—and their informal time spent afterward—holds enormous potential for limiting the impact these community assets can have in rural spaces.

While some interviewees lacked formalized degrees or certifications, many people have local/experiential knowledge about natural phenomena, radar (and its limitations), recent trends in disaster effects, as well as a historical knowledge that included accounts of hazard events that sometimes occurred prior to the lifetime of the respondent. When asked questions about their experiences with a variety of natural hazards, respondents were able to recall robust and detailed stories from their lives, often dating back to childhood. It was also not uncommon for interviews to focus on intergenerational knowledge from family or community experiences dating back to the late 1800s. This local knowledge and a deep and intimate connection with their community allows them to utilize networks of unofficial experts in their community to gather information about a potential or emerging crisis. In contrast, as discussed in Built

Capital, local knowledge can also serve as an impediment to preparedness. Local knowledge that previous generations never experienced a hazard event while living in a space under constant threat may produce a false sense of security that it will never happen to them.

4.7.2 Human Capital – leadership

Informed leadership has been shown to be essential to rural and disaster resilience (Flora and Flora 2012; NASEM 2019). Given Oklahoma's proclivity for a variety of natural hazard events, leadership is often very experienced, according to respondents:

> Oklahoma's typically, in the national ranking, usually about the 3rd nationally[7] in presidential declarations, or disaster declarations, so they've got a lot of experience and know what they're doing. They're very well-seasoned, and they've got great leadership (BSACE).

Interviewees often did not speak in much detail about quality leadership. When they did discuss it, respondents were very happy with state leadership in Oklahoma and were confident that they all work very hard to connect smaller communities to larger state resources:

> We have got a couple of people that work on the state level that are really, really good and they're helping us…they have been very helpful, and they're very good at guidance. So if we don't know what to do or if we have a question, I call either one of them and I get a good answer and I get it promptly (DGFCANT).

Most interviews did not tend to comment about leadership within their communities. This is perhaps unsurprising as those interviewed were often fire chiefs, police chiefs, executive directors, or others that were directly charged with leading during an

[7] According to FEMA, the state of Oklahoma has declared the 3rd most Major Disaster Declarations (N=79) in the United States from 1953-2016 trailing only California (N=81) and Texas (N=90) (CRS 2017).

emergency or crisis. However, some interviews did discuss faith in their own communities' leadership. Overall, interviewees from both regions spoke positively about leadership in their community. In Washita, many departments operate in a very bureaucratic and siloed capacity. An interviewee described this dynamic when discussing risk associated with water contamination:

> I think it's, first and foremost, the supervisors from each department…again, you're not cross-trained in all the other departments and everything to be able to take care of each other's departments. I think it's at least the supervisor's immediate response, immediate knowledge of what's going on. But if I have a line that breaks at Fort Cobb, again, yes it would be a catastrophe and yes, I would know who to turn to, but my first response is going to be to make sure that the plant gets shut down and make sure we're not pumping any bad stuff in, that we're not getting any infiltration. Again, that's not going to be something that my emergency management, my street department, anybody else knows, so first and foremost, I think it's the manager's responsibility (KBWTFC).

Limiting the number of people who can make decisions during a crisis puts enormous pressure on those decision-makers. In Washita, emergency management had included plans to protect these decision-makers from a developing crisis by designating a "survivor" for each department (BOVFLGFC). Moving to a secure location protects the lives of department leadership across the community. Ensuring that the leadership committee is safe ensures that each department operates to its fullest capacity during a crisis. Having them all in secure locations allows department heads to better communicate and coordinate efforts between their agencies. Last, it protects the integrity of the overall leadership structure.

In Kiamichi, a different perspective on leadership emerged. A few interviewees discussed the drastic improvement in their leadership after a change in administration. In one community, financial mismanagement of the local municipality inhibited the

community's ability to fund crucial infrastructure projects by precluding that community from applying for grants:

> Respondent: They finally got all of our audits caught up, so now we can start applying to grants, and trying to get some help…Because our past administration was poor. They had 15 years of audits, back, that weren't even supposed to been done so it was horrible. And they didn't care. You know, and then we got a city council that started to care, and they started getting it caught up, we got a new auditor, got a bunch of stuff taken care of, and they're caught up now, so we can actually do something (SMEMCL).

Two other respondents discussed a similar situation with their local sheriff's department. A change in leadership brought a renewed faith and confidence in upholding the public mission of law enforcement, safety, and security in their community.

The final theme pertaining to leadership is tied to perceptions of the potential for outside influences to affect the decisions of community leadership. Interviews conducted in the Kiamichi watershed were saturated with fears surrounding water rights, corporate influence, and the mismanagement of their most critical resource:

> Well, it's down to management. [T]here's going to have to be a balance and lots of things taken into consideration. The oil people, they think they're the only people on this planet and you've got other groups that think they're the only ones. It's going to get down to management, that's what it's going to go down to. We're going to have to think smart… We want the generations to come to have the opportunity to be all that they can be. They cannot do it without water. It is the most valuable natural resource on this earth (JEFSVAL).

Ultimate decision-making power about whether to sell water to Oklahoma City or Texas lies with the Choctaw. Overall, folks in this region have nothing but great things to say about the Choctaw nation and their positive impact in their communities in southeastern Oklahoma. However, one interview discussed the problematic nature of the information used to inform these leaders:

> How did [the Choctaw Nation] go in and sign this agreement when the State of Oklahoma never saw the water model? No one's ever seen it. I asked the Choctaws about the water model. They had hired a guy by the name of [redacted - private name] who has a PhD in hydrogeology or something like that to review the model. They said, "He said it looked okay." A third grader could have drawn it out and so that's the Stella model. They're just modeling how they're going to transfer the water. They're not modeling streamflow. They're not modeling temperature. They're not modeling future changes in climate. They're not modeling any scenarios, management scenarios. What happens when you release that much water? I think there's just a general lack of knowledge at this point. I'll give you an example. After the agreement was signed, the Choctaws, their attorney went on a little road trip around southeastern Oklahoma and went and spoke in many different communities, these town hall meetings, and explaining how … This is the picture that they paint is that they've save the river with this agreement. They saved the river (RDOUTAL).

This quote demonstrates how important information, training, and knowledge have for leadership to make holistic, well informed decisions for community health. This example also highlights the critical importance that access to political decision-makers has on community outcomes, confidence in leadership, and facilitating public goals. This dynamic will be explored more thoroughly in the following section: political capital.

4.7.3 Human Capital – personnel

According to respondents, the number of available persons to assist during the crisis is the main barrier to community resilience. This can be understood in two analytical dimensions: population size and volunteer availability. Interviews in both the Kiamichi and Washita regions discussed the lack of people available to call on during a crisis:

> For me, it would be manpower. If we have major incidents, we have to call everybody in. Tornadoes, we call everybody in. We work 12 hour shifts. I have three officers on a day for 12 hours, and then I have another three on. That's for the entire city of Anadarko. When we have tornadoes, or something like that, the phones go crazy. We have officers running

> from calls to calls. We have to call other people in… Additional manpower would be nice. It's a dream (RJPC).
> Man-power sometimes is a little bit, depends on certain times of the year and different, of the day. We do have to pull from different communities when we do have situations. I think all in all we have a good amount of resources (DLSDFC).

These representative quotes from two different interviews in Washita describe the challenges associated with a of lack of able-bodies. Simply due to population size and the large area over which rural emergency management preside offers a potent set of challenges that rural Oklahoma must navigate. While highly knowledgeable, trained, and dedicated to their communities, volunteers also have inherent limitations.

> Yeah, just living in a small community, the biggest barrier is resources. Have a police department that is mainly volunteer, our emergency management system that are probably people that go home at 5:00 and it's just because we don't have the resources or the money…we don't have those that they would have in a larger town. Full time fire department or a full-time police department, things like that. Full time notification system. I don't know if the horns would go off if a storm or something happened at midnight. It would take somebody time to get notified, get down there, punch in any type of, well we have a horn. The resource we have here, we adapt to what few resources we have (JBSBSFC).
> Today, right now, if I paged out for a fire, we'd be real stressed on having enough people to cover it. Maybe the two medics, and this guy here, and me. Everybody else is working their job. Now some of them can leave, but like a wildfire may take all day and half the night. They may or may not be able to leave. Your volunteer staffing is an issue, and from what I've learned from other departments, it's an issue over the whole state. People your age are not volunteering. The people my age that are volunteering are getting too old, and they're ready to get out of this kind of stuff, and the younger people are just not volunteering (DGFCANT).

Here, in an interview from Kiamichi and Washita (respectively), respondents discussed the main problem with volunteers. Volunteers simply have too many responsibilities. When one's livelihood depends on employment, volunteers may not be available to respond in the same amount of time or numbers as a fully funded agency with paid emergency management personnel. Working far from their equipment, department, and

other volunteers extends the time to coordinate, communicate, and mobilize this labor force to respond to an emergency. The latter quote hints at another facet in the second analytic dimension of the issue of volunteer availability: age. Many respondents discussed the aging population as a barrier to community resilience. According to participants, the population in these rural spaces are getting older, making them less physically capable of the fulfilling the demands of their employment and volunteering:

> Now I think as much as anything else age and just being physically ... Anything that's involving physical labor or work, getting out and doing whatever you needed to do would be the hardest thing for us right now, but we manage (PPMFC).

A model for disaster resilience that relies on volunteers requires an immense amount of money, time, energy, and physicality from those volunteers. They must retain certifications, attend coordinated emergency seminars, participate in routine training, and make themselves available at any time. According to participants, younger people are moving out of the area and older people are moving back to retire in the country.

Some communities have utilized innovative means to circumnavigate these issues. In Kiamichi, a local prison program offers a frugal option for drawing on alternative labor options.

> …back in May we had a big storm come through. 80 mile an hour winds and that meant it blew trees down. Yeah, the only thing we did is clear the road… Power can't get to the crossing roads, you know with the high lines down. Which that night we had the county came in, the state came in, we came in. And we had the prisoners come, they got a deal down in Nanders, that the prisoners in jail they got a work crew. Brought them in and helped drag brush and get things going (MHCWSBJG).

This prison program seems to be limited in its application—as it was only mentioned in two interviews—but it demonstrates the effectiveness of looking at alternative,

unconventional solutions to routine challenges faced by rural communities with a lack of able-bodied volunteers to assist.

4.7.4 Human Capital – public health

Concerns about public health extend far beyond the pool of eligible volunteers. An increasing elderly population also puts additional demands and considerations onto emergency management:

> …the majority of the residents around here are of an older age, so it's harder for them to get to a shelter. We've got several community shelters here, but it's not necessarily easily accessible for somebody who may be handicapped or they may have to carry oxygen with them or something like that (DJPOLCL).

In this particular community—staffed with only two police officers, including the chief—locating and assisting the elderly into community or private shelters is incredibly challenging. Losing power for days or weeks in some places holds catastrophic potential for those community members who rely on that power source to provide them with constant medical care (Kishore et al. 2018; Straub 2020). A lack of serviceable, staffed, and licensed ambulances in many smaller communities in Kiamichi also dramatically affects community health during a crisis:

> Retirement means you're old. And you want to go somewhere and kind of enjoy life and relax. But you also need to be prepared for your medical situation that could worsen. "Hey, Mr. Johnson. We're glad you're moving to our new town, we like your new house. By the way, the ambulance is about an hour away, so if you have that heart attack you're expecting to have, try to hang in there for us. But thank you for moving here. We appreciate it." And like I was saying, when the majority of the population in a city or an area is of the elderly age, you don't [have] an EMS service, that's a huge deal… I want an EMS service just as bad as 97-year-old Miss Linda who lives around the corner and can't move. There's a lot that I would like to see change around here, but it's going to be extremely hard to do because of the financial state of the city (DJPOLCL).

4.7.5 Human capital summary

Overall, human capital is a critical lynchpin that sustains rural communities. A lack of financial capital forces communities to rely on people. Volunteers are essential to providing emergency services. Individuals donate their energy, time, and sometimes health in service to their community. Quality leadership at local and state levels is also important to instill trust and faith in institutions. However, increasing outmigration of educated younger people and the inflow of retirees means that the population in these rural spaces is aging rapidly, increasing vulnerabilities and requiring innovative and tailored approaches to emergency management. The next section will discuss community perceptions of their access to and influence with political decision-makers, locally and outside their communities.

4.8 Political Capital

Of the seven distinct forms of capital included in the CCF, political capital is the most difficult to define and measure (Ritchie and Gill 2018). Broadly, political capital is the degree to which individual and community goals are able to be converted from informal norms, values, and belief systems (i.e., from cultural capital) into formal, institutionalized forms—such as policies, laws, and regulations. These official pathways have enormous potential to shape the distribution and growth of financial, built, human, and natural capitals. Political capital is often converted from and to cultural capital. Political capital is also closely tied to social power. While occupying authoritative or political positions in local, state, or federal government grants those individuals

immediate access to political capital in a direct sense, many of these decision-makers regularly consult or anticipate the wants and desires of those who hold power in their constituency. Identifying patterns of access to and influence with decision-makers with the authority to translate values and beliefs into policy is key to understanding where political capital resides and how it functions.

Rural communities are often spatially, economically, and socially disconnected from larger arenas of political power such as state and federal legislators. Characterized by bonding social capital, insular rural communities often focus their efforts on local officials and authority figures to bring about change (Flora and Flora 2013). Data from interviewees suggest that this is the case in rural Oklahoma. For Washita and Kiamichi, conversations about political capital were demarcated by insider/outsider boundary making. Interviewees discussed access to and influence over decision-makers in two distinct ways: local (community) and extra-local (regional, state, and federal). Beyond a few interviews, participants from Washita rarely spoke about political capital. In contrast, Kiamichi respondents discussed their access (or lack thereof) to decision-makers in nearly every interview. Analysis suggests that this is due to the century-long legacy of conflict over property and water rights in this region. Folks in Kiamichi felt unheard and abandoned by larger political entities, particularly the state government. While frustrated, these perceptions caused participants to feel a sense of futility in appealing to the state polity and, consequently, facilitate a focus on local politics.

4.8.1 Political Capital – local access and influence

Local politics in rural communities is characteristically different from state or federal level politics. At this scalar level, community members tend to attend local town halls, public forums, or other events. Decision-makers often are directly elected by the community. Many of these positions are also unpaid, suggesting that decision-makers participate in local government out of a sense of civic duty and community responsibility rather than as a profession, for financial gain, or for their own self-interest. The voluntarist element here puts these decision-makers in a better position to appreciate the issues of the community because they too face the same social and economic challenges by living and working in the community they serve. This inherently makes them more accessible and accountable to members of the community. The close-knit culture of these smaller communities means that people often personally know their decision-makers (and their families)—granting them greater potential for holding officials accountable to their constituency:

> What we've tried to do when you've served in the public as long as I have and [redacted-private name] has, what we try to do in Emergency Management here is when do you want these sirens set off, on a warning, a visual sighting, winds over 80 miles an hour, so the public don't come jump on us, we have a planning committee, emergency planning committee and it's the citizens of this county, they come in and they make a policy on when we do what. They can't blame us, they can blame their Uncle (PCHEMBJG).

Being able to participate in local politics, influence decision-makers directly, and hold them accountable fosters a feeling of confidence toward local officials. Overall, respondents articulated a large degree of trust that local institutions are capable of addressing the the risks posed by environmental hazards to their communities:

> I think we [have all the resources we need] right now, and if we don't, or if there was something else that they thought, then I think that the city council and the mayor, and the county commissioners, that they would be hunting things down. They would be looking into finding out if there was some other resource that we need. I think the county and the city, I think they do a really good job of taking care of things like that, trying to prepare the people (BSNPTAL).

However, while the small, intimate composition of communities in rural Oklahoma make emergency management more engaged and accountable to their constituency, the quality of those who occupy key positions carries greater weight. In smaller communities, there are fewer people who are willing to donate their time or to take on the obligation of all that emergency management requires. For those who might consider some of the few paid positions in rural Oklahoma, the training, personal risk, clerical responsibilities, and affiliation with a governmental entity are not necessarily attractive in places where people generally distrust institutions or the government more broadly. Paradoxically, the remoteness of some rural communities provides relative autonomy, creating an obstacle to trust in quality leadership when no external accountability exists for those decision-makers. In Washita, a director of a local utility articulated these frustrations:

> Okay, no I don't [feel that we have all the resources we need]…The reason I say that is because this: When I first went to the local [town hall] here, I got told that we have water buffalos…Then I got told they're on semis, [but] the tires are flat... In every single meeting I ask the same question: "So did we get the tires fixed on the water buffalo somewhere?"… and the same answer has been given time and time and time again… there's nobody saying get those tires fixed… We really, as far as I know, don't have anybody regulating our locals to make sure that they are doing what they need to do so that we can do our job. Yes, I can tell you that if I was to run out of water, I got water buffaloes over here. Then I'm going to have to turn around and tell you, "But in a natural disaster, really are you going to be changing the tires???..." That's not being prepared (KBWTFC).

To provide context, a water buffalo is essentially a flat-bed tractor-trailer with a large tank to distribute potable water to the community in the event that an emergency severs their community's access to safe water. This contingency plan would allow the county to provide water for essential use for two or three days while service is restored or other solutions are developed. According to this respondent, the emergency management authority in their county was unreceptive to their questions about the functionality of the water buffalos in perpetuity since her appointment as Water Utilities Director a few years prior to our conversation. The situation had still not been resolved at the time of this interview.

In Kiamichi, quality of leadership is also generally very good according to participants. Where poor leadership does exist in some places, the personal networks and connections to neighboring communities allow emergency managers to navigate poor or negligent localized leadership:

> [Redacted - private name] down in Antlers, the [redacted - job title] for Antlers has been a big help. He and I talk quite frequently, and he is a really, really big good. He is a very, very intelligent person, and he'll help you any way he can. I mean, I rely on him a lot for stuff that I can't get from the city, I rely on him, through Push county, to get it (SMEMCL).

Many interviewees spoke to quality of this particular person. They have a long history of serving their community, making connections to other communities for mutual assistance, stepping up when funding issues caused their communities to lose vital services (like an ambulance), and many other examples in the Kiamichi interviews. However, this emergency manager had a very dim outlook on the future for the community:

> It's difficult. I'd like to retire. I'd like to feel like somebody could take over. Right now I don't feel like that. I know that everybody's replaceable,

> but I want to be replaced with somebody who has the drive and the resilience and everything else to provide and be concerned about it. "Well, hell, it ain't my fault we ain't got nobody to come pick you up." That's just not acceptable… I want people to have more buy-in in it. I want the community to want more. Clayton, the north end of the county, lost their ambulance service. I have to cover the north end of the county now (DGFCANT).

This respondent had mentioned earlier that he had retired, and when no capable person took over the post, he returned to emergency management for the sake of the community.

For rural Oklahoma, these analyses suggest that the vast majority of communities have an enormous amount of faith in their emergency managers. Nearly all participants mentioned that, despite challenges posed by a lack of financial, infrastructural, and technological resources, their communities "…accomplish the impossible with nothing." Confidence in rural emergency management is in part due to the access, influence, and political engagement people have with their local municipalities. Influence over decision-makers is enhanced by the intimate, personal nature of these small, rural communities. But the lack of available people (due to an aging population and the out-migration of younger generations presented in my analysis of Human Capital) makes communities reliant on quality leadership with a sense of commitment and "buy-in" to community resilience.

4.8.2 Political Capital – extra-local access and influence

Interviewees from Washita and Kiamichi widely differed in their commentary on political capital to larger institutions beyond their communities. In Washita, direct discourse was virtually non-existent. Essentially none of the participants remarked directly on their lack of access to state and federal decision-makers. However, some

perspective can be gleaned from indirect references to the ways in which political capital is converted into other resources. Analysis of financial capital already detailed the frustration of respondents with the bureaucratic, top-down structure of equipment distribution. Here, the "trickledown" economy of equipment rarely makes it to rural communities (or the wear and tear put on this equipment reduces the quality, durability, and viability of that equipment):

> Most small fire departments now have probably three or four SCBA's (self-contained breathing apparatus). They should have one for each man. My department has a hazmat team. Our SCBA's are getting, they're almost to their expiration dates. We don't have the money to replace them, so we're going to have to use expired equipment like that…Doesn't sound like a big deal until you need it. It doesn't sound like a big deal until you price it and try to buy and then whoa, that stuff is bad. We're well-equipped. We are not as well-equipped as we should be. I think every sheriff will tell you that. Maybe Oklahoma City, maybe Oklahoma County are good enough, but I don't know. Rural sheriffs sure aren't (LMASFC).

Extending beyond equipment and financial needs is the need for better information that might make it easier for emergency management to respond to a crisis. The conservative political climate in Oklahoma puts a premium on the protected rights of individuals and corporations. Protecting the proprietary rights of these entities carries with it public safety concessions, according to one interviewee:

> Oklahoma, OU [University of Oklahoma], has a good database. It's like okay map or something, but ... You get your water sheds there and you get a lot of infrastructure data. For natural disasters, you've got to think power lines, poly lines, railroads. Where's all that data? That's held by private companies. It's up to them to give us what we need to go ask for, or it should be public I think. It should be. Where does the power lines runs in my piece of land? (NLBIAFC).

The lack of disclosure by private companies could be crucial for properly assessing a situation following a natural or technological hazard event. Although there are legal pathways to force private companies to disclose information to public safety officials

during a crisis, the time to procure this information to a Freedom of Information Act request (FOIA) is often time consuming and rigorous (recall in Human Capital how issues related to staffing, time, and process specific knowledge forestall if not prohibit application of grant assistance—the same can be said of requesting FOIAs). Time is one of the most vital resources in responding to a hazard. The time lost procuring those permissions has the potential to increase risk during a disaster. Another indirect reference was related to policy, regulations, and unscrupulous organizational behavior in the agricultural industry. One particular respondent in Washita discussed some of the economic challenges of being a small-time rancher:

> There's still good money to be made in the cattle market. I think that it will come back if the big dogs don't manipulate it too much. I wish there was some way that we can alleviate the possibility of somebody manipulating markets for their gain. We're talking billionaires that do this. That they could care less. Huge corporations. I wish we could get to a point where they couldn't manipulate the market as much. I know we're trying to make some advances on that, but it's just tough. When they can drive price down just so they can get it where they want it, I think that's very unfair to our nation, but it happens (MSPBFC).

While these arguments derived from respondents in Washita are largely inferential and difficult to trace directly to political capital, participants in Kiamichi were much more animated, direct, and critical of policy-makers. Findings throughout these analyses of capital have been grounded in a foundational issue to southeastern Oklahomans—access and rights to water. The reader will recall legal battles with Dallas before and after the landmark United States Supreme Court decision on the "Red River Compact." Respondents articulated how little regard Texas held for Oklahomans:

> They were having public official after public official up telling how bad they needed the water. Texas was growing and they would get up and make statements like, "Oklahoma is nothing but an Indian state. They're

> not going to grow. Texas is the one that's growing and we need the water down here." That's the kind of statements they'd make (JEFSVAL).

This urban versus rural mentality persisted in the ongoing battle with Oklahoma City over gaining access to water from the Kiamichi basin. A one hundred-year legacy of "country versus city" has created a culture of explicit distrust, disdain, and disenfranchisement for folks in southeastern Oklahoma. As one former state congressperson stated, "I made a lot of friends with southeastern Oklahomans when I said 'the city looked best in my rearview mirror on my way back to southeastern Oklahoma'." Commentary from respondents suggested that they have little influence with decision-makers for two reasons: they were rural and they were poor:

> Money's the issue, and how much political clout do you think a county of 11,000 people has when a neighborhood in Oklahoma City has more voting power than this whole county? What wheel do you think is going to get greased (DGFCANT)?

A similar conversation developed in another interview—not in regard to water rights, but to the payment of state insurance claims following a flood. Here the respondents discussed the exclusivity of political access and action in Kiamichi:

> Respondent 2: Squeaky wheel gets the grease… There's a clique down here… I'm not in it.
> *Interviewer: I wouldn't have thought there would be politics into that. I mean, even.*
> Respondent 2: There is (TSHCC_BJG).

According to interviewees, Oklahoma City's pursuit of gaining access to water rights is relentless causing many to believe their fight is futile: "long story short, it's gonna happen. We just don't know when. We don't know exactly where that little dam's gonna be put up (SPACCANT)." Interestingly, participants remain steadfast and dedicated to

resistance. Many local papers make a concerted effort to keep the public informed of developments related to protecting water in southeastern Oklahoma:

> The paper has really been staying on top of all of that as far as making people aware that what Oklahoma City is wanting to do [acquiring water from Sardis], so that the people can be informed, stand up for their rights, and we just did an article last month, I think, about when Oklahoma City wanted to extend their permit rights or something, and so some of our representatives from down here went up there and tried to stop that. Was it last year or the year before, the Chickasaw Nation and the Choctaw Nation went together and sued the State of Oklahoma for that water rights, and the Indian Nations won. So they got this treaty, kind of like treaty thing, set out where Oklahoma City can only use so much water from Sardis Lake, which is the main source, Sardis Lake and the Kiamichi Basin, I think. That's a big concern in this area is making sure that our water rights are protected (BSNPTAL).

This respondent pointed to one of the major reasons Oklahoma City has not already obtained water rights.

According to participants, it has little to do with the regions nearly unanimous disapproval of selling the water to Oklahoma City—especially in light of how those arrangements worked out in places like Atoka. In fact, one participant mentioned the legal action of pro-Oklahoma City lawyers in creating additional barriers to local communities having a political stake in ongoing water negotiations:

> It depends what your definition of "who has a stake." The water board, Oklahoma City published their application said, "We're applying for a permit." Then people turn around and they file a protest. One way that the water board whittles down the protest and gets rid of some them is it has to pass a litmus test. Their litmus test, I think, "is do you own property adjacent to the river? Does the river actually flow through the property? If you don't actually have the domestic riparian water rights or if you don't have an existing permit, then you're not really a stakeholder in the process. It won't really affect you…" which I think is wrong…that's our drinking water so can you tell someone who lives 10 miles away from the Kiamichi River but is on rural water service drinking the water out of Sardis Lake that they don't have a stake or a claim in this (RDOUTAL).

The reason as to why Oklahoma City has had so much difficulty in gaining access to some of the water in southeastern Oklahoma is the sovereign rights of Indian Nations. A treaty dating back to the 1830s granted the Choctaw and Chickasaw Nations exclusive rights to the water in this area. The sovereignty of these tribes makes acquiring water much more difficult and problematic, not only for Oklahoma City, but for other citizens in Kiamichi. They are often excluded from the negotiating table by the political jockeying of representatives of Oklahoma City and the Choctaw and Chickasaw Nations:

> When our concerns, not just mine, but [redacted - private name], our [Oklahoma Rural Water Review] board members, and things were just not taken into account, that's when I realized that I'm ineffective. I'm not going to take your money any more. I'm not going to work for you all. I'll continue to speak with you all and work. I still go to a lot of these meetings. I'm still in contact with [redacted - private name]. We're still in the same loop, but I wasn't going to be that thing anymore because I'm still … They just weren't listening. I don't know why… It turns out there's been some kind of shady stuff that's happened. I'll say it appears that the State of Oklahoma has actually taken steps to prevent Choctaws from finding out information that's vital to this agreement, to making sure that they don't know some of these things. They're very similar to, if you remember, to the fracking. We had a geologist here on campus. I think his last name is [redacted - private name] or maybe first name [redacted - private name]. I think [redacted - private name] had sent him an email trying to get him not to admit publicly that some of these earthquakes are due to disposal wells, that was kind of a little scandal thing, kind of a silencing of the science, kind of muting the science. I think that the same thing happened in this case. I think that that there were some attempts to keep the Choctaws in the dark about some of these issues so that this agreement would go through without a problem (RDOUTAL).

The account of this participant highlights some of the challenges of acquiring significant stores of political capital for rural communities in the Kiamichi region. The dynamics introduced by powerful political and economic interests trying to exert political capital in order to acquire natural capital intersect with the unique sovereign dimensions of Indian Nations in Oklahoma. All of this occurs in a relatively isolated sphere of influence

detached from and despite local resistance of rural communities. Not only did participants talk about their lack of voice in their state government, but several interviewees indicated that the legislature is opportunistic. Deaf to rural interests under normal conditions, after disasters occur their tone shifts. Several respondents were quick to indicate that politicians are all to eager to come to rural communities to view the fallout of a tornado or wildfire, promising (very publicly) that the community will be rebuilt better and stronger under their leadership.

4.8.3 Political capital summary

Broadly, rural communities in Oklahoma have intensely strong faith in local decision-making because of the close-knit, intimate social bonds between emergency management and the communities they serve. Beyond these tight-knit communities, participants believed they have very little political influence in larger political arenas—particularly at the state level. In Washita, the absence of direct discourse about their political voice potentially suggests that they were resigned or even apathetic to this political arrangement. Knowing that they have no voice, and have little prospect of obtaining one, rural communities simply persist—their faith in representation of their interests at those macro levels, shattered. In Kiamichi, frustrations relative to their lack of political capital outside their communities was more vocalized. Their outrage was well founded as powerful state-level political interests have been aggressively trying to dispossess the Kiamichi basin of their most vital natural resource since Oklahoma first became a territory in the early 19th century—nearly two hundred years. The Kiamichi basin did have a powerful state actor who did act in their interests (and he was lauded as a

local hero in most interviews that discussed water issues) but this was framed by interviewees as an exception rather than the rule. The following section will conclude the analysis chapter and will detail what some scholars argue is the most important form of capital for disaster resilience—social capital (Ritchie 2004; Flora and Flora 2013; Tierney 2014; Meyer 2018; Ritchie and Gill 2018).

4.9 Social Capital

Broadly, social capital can be thought of as similar to social networks—the relational pathways through which individuals and groups gain access to and secure resources from other social actors and geographic spaces (Woolcock 2001). Social capital is the connective tissue, woven into the structure of society itself, that makes social exchange possible. Social capital operates along two distinctive analytic lines: the existence of the pathways themselves and their strength. This latter dimension is qualified by levels of actual and perceived trust and reciprocity. Trust and reciprocity are crucial to the establishment and maintenance of social capital.

There are three main types of social capital: bonding, bridging, and linking. Bonding capital is characterized by relationships between individuals or groups of similar ascribed characteristics and those that have a shared set of social conditions. Relations of bonding social capital are intimate and strong, typically formed through ties to kinship networks and tight-knit communities. However, due to their homogeny, networks of bonding social capital tend to have stores of resources which are very similar in type, quality, and quantity. Therefore, bonding social capital limits how individuals in those networks can gain access to diverse resources not endemic to those small, intimate

networks. To gain access to larger, more diverse networks, bridging social capital must be established, preserved, and maintained. While bridging social capital is not as close knit or intimate, social actors can gain access to other configurations of community capital not immediately available to networks characterized only by bonding social capital. Linking social capital helps to explain relationships between individuals or groups that have unequal power. For example, a government agency and a local citizen. Here, social exchange benefits the more powerful entity in contributions to sociopolitical legitimacy and faith in that institution.

In Washita, Kiamichi, and other rural spaces, bonding social capital is the most dominant type of social capital. Communities are more or less similar in terms of their socio-economic status, race, ethnicity, and religion. Moreover, these communities experience similar social conditions and face comparable challenges. A common or shared set of characteristics and social conditions make bonds within communities exceptionally strong. However, bonding social capital also acts as an insulator for these communities and boundaries between "insiders" and "outsiders" are clear and distinct. Cultural capital is a key driver of perceptions of trust and reciprocity for rural Oklahomans, especially about urban spaces. Data from interviewees show a clear divide between rural residents and spaces perceived as urban. This bifurcated relationship results in a lack of faith in some institutions, primarily state government. Below I present evidence of this "community disenfranchisement," the innovative and creative ways in which communities navigate these challenges with respect to environmental hazards, and the outcomes that these relational dynamics have on vulnerability, risk and resilience.

4.9.1 Bonding social capital

Overwhelmingly, participants discussed the intense and personal relationships they have with members of their community and those in adjacent communities. Interviewees spoke fondly of their community and communities like theirs, often referring to individuals by their first names. Respondents usually followed by a positive anecdote about the quality of their character and an offer to introduce me to them, even sharing the personal phone number of other community members by memory. Stories about the close nature of these intra-community relationships often detail routine social gatherings, tales of tragedy or heroism during a crisis, and family ties. In fact, "family" was sometimes used interchangeably with "community" by participants:

> 2007 we had a big flood. We have anything like that, it's just a community effort on everyone just coming out. When we had the flood, everything gets through the middle of the week. The next day, they turned out school, and they did not force them into it, and they didn't even encourage it. Everyone in school was able to come down and start helping everyone. It was really amazing to see 300 kids out on the streets helping them pull out stuff and clean out the houses and clean out blimps and everything else. Once again, we're all just a family, we all just pitch in. We don't even have to ask, it just happens (TCCCJSFC).

As mentioned previously, a culture of volunteerism facilitates community engagement during a crisis. While the tight-knit relationships and support between community members is part of the culture, respondents also realize that if tragedy were to strike they would need the help just as much as their neighbor.

> So being in this location right here, you know we're in an excellent spot and the fire fighters or people like me, we're the farmers that own the land and that's one reason we like to volunteer because usually when the fire whistle blows it's usually going to be on one of us. You know, so we're just kind of helping each other (KBFC).

A local insurance agent in Washita also talked about the collective mindset of community members during a crisis and how they put others' needs before their own:

> People are usually pretty patient when it's a major disaster. They generally want the elderly to be taken care of first. They don't mind waiting their turn. I was impressed, we've had disasters, people from other communities have said, "Hey, I've got a claim, I'm going to turn it in, but tell them to put me last on the list because those other people need help worse than I do" (DTIAFC).

These two quotes typify the intra-community sentiment of most interviewees. There is a strong trust that community ties will oblige people to come to the aid of their neighbors and community members. Trust is coupled with strong expectations of reciprocity—that their commitment to helping someone else is mirrored by that same obligation from others in the community. Strong, intercommunity social bonds extend to officials in emergency management positions too:

> I mean, we are proud to help one another around here and be a part of that… Even in an emergency situation, community involvement. There was no one here from the state, there was no one here from the county, during this last incident. It was neighbor on neighbor, officers running chainsaws. You go around this community and ask, "How many state people come here? How many politicians come here? How much help did y'all get?" That's what you're going to hear. "Mr. Johnson come cut that tree up. And one of the police officers stopped and helped us get this tree off the car." So that's what you're going to hear and that's what we're most proud of… Never quit. No matter, that's just putting it plainly, but no matter what situation, no matter what is thrown our way, no matter what has happened, we're still here. We're still here as a community. It's not my police department. You ever hear me say the word I? It's us. We did this, we did that. And I say it as a community (DJPOLCL).

Several interviewees remarked that informal phone trees are often used to communicate crucial information across the communities about a developing crisis in order to mobilize their volunteer network. Beyond donating their time and bodies, bonding social capital

also facilitates access to equipment and resources, often donated by local community members or businesses.

> We made our calls, we got people in an area. In this situation we had to use the Choctaw Country Store here, because they have generators. That store was lit up and operational and everything. We used their parking lot as our command center and got through it (DJPOLCL).

In this particular case, high winds had disrupted access to power, rendering the local police department unable to coordinate response efforts. The local county store donated generators and space to allow emergency management to facilitate a quick and capable response to community needs.

Emergency management also share resources across communities. In Washita, respondents spoke explicitly about mutual aid agreements which oblige adjacent communities to mobilize their emergency management to help neighboring towns. Mutual aid agreements also extend to other facilities, like a Washita technology center:

> We stay in partner with our local police department and our county sheriffs. We have meetings with them frequently during the year. We try to stay up as much with them and I want them on my campus as much as possible, going through, being aware of my buildings, in case of a disaster. When they come on and they start searching, they kind of know what the interiors of buildings look like and if something was to happen, when they walk on campus, I can hand them a set of maps to every building and the layout of the building. That's just part of our agreement. They have a copy of it down town at the police department. They have a copy of it at Anadarko with the sheriff's department too. I say, we've tried to cover all of our basis as much as possible, with our local authorities (DDCKTCFC).

While mutual aid agreements are official, formalized commitments to intercommunity emergency management efforts, informal networks also exist. In Kiamichi, a local fire chief detailed the shared training space they make available to fire departments throughout southeastern Oklahoma:

> …we have a training facility out here by our $300,000 building. We can do live burns and two-story live burns. We do high angle rescue off that building with a classroom and a substation. What I like about the facility is that it's open to anybody that wants to use it, and it's free of charge. We don't charge anybody to use it, as long as if they use expendable stuff they have to replace it. That's the end of it. This past month McAllister has been here twice to do live burns. Last month Caney over in Atoka County came over and done live burns. We do our own burns in there. Hugo uses it. Everybody uses it. It's a regional training center. That helps us. Yeah, I'm happy with how we have and stuff. It would be nice if it wasn't such a strain to pay for it (DGFCANT).

Although arrangements of bonding social capital with established expectations of trust and reciprocity are assessed as overwhelmingly positive according to most interviewees, variance does exist. Participants occasionally discussed two potential threats to maintaining strong community bonds: leadership and a changing culture. A few participants in both Washita and Kiamichi mentioned their frustrations with certain individuals in leadership positions. Individuals who were the focus of these criticisms were seen as lazy, incompetent, and acting in their own self-interest. Some of this commentary described the friction between emergency management leadership in establishing clear chains of command during a crisis. Respondents occasionally spoke about officials not being able to "swallow their pride" or "ego" when honoring a mutual aid agreement or informally responding to a call for help:

> Not to be mean, but [redacted - private name] just gonna feed you a load of crap, who will get you what you wanna hear. That's just emergency management. That's sad for me to say, but it's just a title sometimes for them (KBWTFC).

Here, certain individuals were perceived as being more concerned with "glory" than community needs. The more worrisome factor for some participants was a perception of a changing culture around community involvement, best articulated by a fireperson in Kiamichi:

> They're not volunteering. I'm not sure how old you are, but the younger generation from even 35 down, they're just not a volunteering group, very few of them…They don't seem to have the sense of dedication to community and public service that the next generation above had, and it's just hurt all of us…Doesn't bother them a bit. I don't know if it's a generational thing or not, but it seems like it is (DGFCANT).

Losing trust in leadership or a waning commitment of reciprocity from future generations is a cause for concern for the future according to some interviewees. Although respondents articulated evidence of bonding social capital as a critical source of strength for building resilience, relying exclusively on these close-knit social bonds also acts to isolate and insulate rural communities.

4.9.2 Bridging social capital

Overall, social ties to external networks which grant access to diverse resources are inconsistent in both Washita and Kiamichi regions. Interpreting the themes across interviews suggests that this is due to two factors: insulation (a consequence of intensely strong bonding social capital) and insider/outsider boundary-making processes. However, disasters, by definition, exceed the capacity of communities to cope with the effects of a hazard event. When local resources are exhausted or the need arises for a specific resource that is unavailable through normal networks of bonding social capital (whose resources are similar in type, quality, and quantity), communities turn to other sources.

In Washita, commentary on bridging social capital was scarce. One particular interviewee explained the variety of external agencies and organizations that provided support in the past:

> Non-governmental agencies. Red Cross, Salvation Army have both been in our county many times. We try to support each other back-and-forth with that. Those would be the two big ones. Baptist General Convention of Oklahoma and their disaster relief teams have been in our county many times. They're a tremendous help. The last tornado that actually affected Anadarko, they came in and brought in their chainsaw crews and things like that and were just great, tremendous help. They're a non-governmental entity that we've depended on several times. That would be about it, non-governmental (LMASFC).

OSU Extension Service was another organization mentioned as a community partner by a few respondents regarding forming local agricultural cooperatives. These do much to increase social capital and maintain relationships for a widely dispersed rural population, but do little in terms of disaster response or recovery. Participants from Washita also discussed their relationship with local tribal nations. Here, as detailed in findings related to financial capital, mutual aid agreements create a formal relationship between tribal fire departments and non-native communities where services are offered and reimbursed for materials and personnel when the need arises.

In Kiamichi, the relationship with native communities was perceived as more informal, congenial, and less obligatory than in southwestern Oklahoma:

> I'll put it this way. Whether you're a member of the Choctaw Nation or not, people that live down there just don't like outsiders. We like our community the way it is. We like the river the way it is. We like things the way they are. We don't like a lot of change especially Texans are someone for out of state or city slickers coming in and doing things. It's very close but then the Choctaw Nation itself is even more closed like you'll never talk to a tribal council member like Gary Batton would never talk to you or any scientist here especially… I think that in events like this really the Choctaw Nation is leading all of these efforts. The way it is even though … You have people in southeastern Oklahoma who are members of the Choctaw Nation and those who aren't but we're all one community. The Choctaw Nation, when they do something, they do it for the community as a whole. They're not very exclusive. It's interesting. Even though they're very closed off to outsiders or whatever, they're very inclusive within our community. They want those who aren't members of the Nation to participate into a certain extent in the culture that is there like we Choctaw

> Festival. Everyone is able to come out and participate and absorb all that that is…. I'm trying to think of any other groups or agencies or whatever and I can't think of any. I've never seen anybody from the State of Oklahoma from any other agencies like in that flood. There was nobody down there helping anybody. It was Choctaws helping everybody (RDOUTAL).

This respondent specifically described the paradox between insider/outsider boundary-making processes and fostering a sense of community. Many other interviewees explained that the Choctaw Nation are often the first to respond to a crisis in their area. The Nation donates water, money for rebuilding roads and bridges during recovery, and invest in mitigation strategies by improving public infrastructure like water lines and reconciling budget disputes between local municipalities and the state. For Kiamichi, it is clear that if individual communities or their neighbors cannot handle an emerging crisis, the Choctaw will.

4.9.3 Linking social capital

Outsider/insider dynamics are not unique to relations between rural and indigenous communities. Perceptions of trust and reciprocity between rural spaces and urban spaces are tenuous and are marked by language of insider/outsider boundary making. Above I referenced a quote from a police chief which alluded to the lack of trust in politicians and "the state" to assist their small community in Kiamichi. Officials in this region pointed to the difference in state response and recovery actions when a disaster occurs near the city—as was the case following the F5 Moore tornado in 2003:

> You know, [the state] went up there in Moore and they were redoing storm sirens. They got hit, they got hit hard. They needed that help. But there was so much money poured into that and left over and was supposed to be dispersed. And we couldn't get none of it (DJPOLCL).

Trickle-down resource distribution strategies adopted by the State of Oklahoma—which position small rural emergency management as last in line to receive updated technologies and equipment—do nothing to alleviate distrust. Most of these grievances were analyzed in the sections of cultural and financial capital, so I will not repeat them here. Interviewees often attributed their distrust to out-of-touch bureaucrats who play political games to curry favor and retain power rather than performing their duty to constituents. Others remarked on the expense associated with challenges posed by state safety regulations which precludes some communities from basic services like a local ambulance. Anti-government sentiments were summarized by this emergency management official: "Everything we've had SNAFUs have been governmental (DGFCANT)." Lack of faith in these crucial public institutions is fundamentally tied to access to decision makers which will be discussed in greater detail in the analysis of political capital.

While the specter of the political bureaucrat is almost unequivocally perceived as negative, throughout my interviews perceptions of national level assistance are more complex. FEMA is lauded and castigated among interviewees in both regions. Some respondents praised FEMA for their quick response, culturally competent approach to working with claimants, and assistance to emergency management. Others characterized FEMA's interactions with community members as disingenuous, manipulative, and pretentious (see the section on Financial Capital for elaboration on these points).

4.9.4 Social Capital Summary

Social capital is of the utmost importance to the development of disaster resilience in rural communities. It acts not only as the connective tissue through which social exchange occurs, but it also influences whether or not communities will decide to tap into those networks due to perceptions of trust and reciprocity. The interaction between bonding, bridging, and linking social capitals are dynamic, contingent, and interdependent. In Washita and Kiamichi, a lack of trust in state institutions and outsiders in general creates an insular network. Rural communities in Oklahoma choose to invest heavily in bonding social capital. I argue that this is an agentic response to a lack of trust and faith in weaker ties to urban centers and powerful political institutions. This creates intense, intimate relationships between rural communities who feel abandoned by their state and (sometimes) federal governments. However, relying on bonding social capital limits community access to diverse sets of resources that bridging and linking forms of social capital can provide. The next chapter will discuss the dynamic relations between different forms of capital; highlight the similarities and differences between community capital configurations in the Washita and Kiamichi regions; critique and advance the utility of the Community Capitals Framework for understanding the intersection of vulnerability, risk, and resilience in disaster research; and discuss the implications of CCF as a practical and intuitive tool for cultivating disaster resilience.

CHAPTER V

DISCUSSION

Analysis of data collected from 56 in-depth, semi-structured interviews demonstrates the complex ways in which rural communities perceive, assess, and mobilize different forms of capital in agentic ways to navigate vulnerability, negotiate risk, and cultivate resilience in rural spaces. Findings also confirm that rural communities in Oklahoma face similar challenges relative to the wide array of hazards present in these geographies. Despite these similarities, tactical deployment of community assets and strategic investment in certain types of capital differ between these areas. While useful, analysis of findings in the previous chapter remain largely unintegrated within the analytic framework of community capital. Furthermore, it is important to revisit the research questions this dissertation answers:

(1) *Referencing the Community Capitals Framework (Flora and Flora 2008), what factors are associated with vulnerability, risk, and resilience to environmental hazards in rural Oklahoma?*
(2) *How do rural Oklahomans perceive risk individually, in their communities, and in their region more broadly? How do these perceptions differ across Washita and Kiamichi regions?*
(3) *In light of these first two research questions, how do communities in rural Oklahoma plan and prepare for, as well as mitigate the risk of exposure to environmental hazards?*

This chapter expands on this categorical analysis and demonstrate the interdependent, contingent, and relational operation of capital for communities in the Washita and Kiamichi regions of Oklahoma.

Since disaster is a process rather than a singular event, I will begin by unpacking the siloed organization of capital analysis in the previous section to explain vulnerability, risk, and resilience. Analysis of findings from each region was integrated. I presented discourse from both regions to articulate the development of each form of capital. The following discussion presents each region individually and present new quotes that specifically indicate relationships between capitals. This structural approach accomplishes a few things. By centering analytic focus on the concepts of vulnerability, risk, and resilience different forms of capital are articulated in integrative fashion rather than categorically. It also aids in regional comparison and contrast. Here, the particular configurations of and relations between community capital in Washita and Kiamichi are more thoroughly explored. Disaster research defines vulnerability as a set of social conditions that exist prior to a hazard event. After identifying vulnerabilities in Washita and Kiamichi as baseline indicators of potential issues that could be triggered by a natural hazard event, I proceed to discussing risk and perceptions of risk. Risk perceptions—built upon the foundation of social vulnerability—inform decision-makers about critical weaknesses in preparedness and response capabilities for these communities. Highlighting the importance placed on how communities perceive their own individual and collective risk is key to understanding community priorities, decision-making processes, and actions taken to assuage vulnerability and risk, thereby promoting resilience. These indicators can also be helpful in identifying community blind spots and

risks not perceived as such by community members. Next, I move to cultivating resilience as the lynchpin of agency, decision-making, and action for continuing rural livelihood in Oklahoma. Lastly, I acknowledge the limitations of this study.

This discussion chapter is developed according to prevailing literature on vulnerability, risk, and resilience and is also organized to emphasize the component nature of these concepts as pieces in a larger integrated whole of disaster preparedness and mitigation. Approaching this section as inherently relational also highlights decision-making processes, which include anticipation, assessment, and action taken by communities to better prepare for the dangers associated with the combination of natural hazards and preexisting disaster vulnerabilities. However, rural communities are constrained by historical conditions and structural forces including policy, ideology, and economics. It is important to clarify and address the challenges that exceed individual and collective community efforts to negotiate ever increasing risk. Lastly, it is crucial to highlight the agentic capacity of emergency managers and landowners to develop innovative processes and relationships to increase resilient capacities despite limitations and constraints imposed by historical and contemporary social structures. The following section will detail how interviewees in rural communities recognize and identify vulnerability as a preexisting set of social conditions prior to a disaster scenario.

5.1 Identifying vulnerability in rural Oklahoma

Vulnerability science rose from the idea that the outcomes of disaster are not precipitated by the hazard itself, but weaknesses in social systems. Social vulnerability, then, provides the basis from which the harmful potential of disasters begins. It is a set of social conditions that exists prior to a disaster that influences the ability of individuals,

communities, organizations, and systems to navigate potential harms from natural hazards (Cutter 1996; Wisner et al. 2004).

5.1.1 Vulnerability in Washita

The community capitals framework positions natural capital as the foundational form of capital for any community. For Washita, natural capital is the source of the economy and tied closely to rural livelihoods. Respondents are keenly aware of how volatile the combination of weather and crop prices can be. The growing specter of climate change threatens to produce more extreme weather, most notably increasingly severe and protracted drought conditions for semiarid regions of the midwestern United States such as Washita (Shafer et al. 2014; Hsiang et al. 2017). Studies by Shafer and colleagues (2014) and Hsiang et al. (2017) are corroborated by localized trends in rainfall which indicate that Washita (and other parts of western Oklahoma) has experienced one of the most severe droughts in the region's recorded history (Fernando et al. 2016; Flanagan et al. 2017). This was immediately followed by record rainfall in 2015, exhibiting the polarity of meteorological phenomena which experts suggest are indicative of the effects of climate change (Oklahoma Climatological Survey 2015). Dynamic and extreme changes in climate experienced by respondents—and thus volatility in natural capital—are directly related to the local economy, subjecting these places to increased vulnerability.

In southwestern Oklahoma, residents are accustomed to rapidly changing weather conditions and a variety of natural hazards. In spite of the precarious conditions of living in this part of the country, study participants in Washita (and Kiamichi) embrace that struggle as a "dubious badge of honor." Cultural capital in both regions of study (but

particularly in Washita) is articulated through qualities of toughness, self-sufficiency, optimism, and persistence. Many interviewees discussed this "rural stoicism" as an inherent part of rural character:

> Real resiliency is just a good character. That they're going to stay after [a disaster] and hopefully they'll be blessed by that and they'll make some recoveries, but they're just tough people and they're good people. As long as they can keep going, we can keep going, we're going to battle through some of these tough times and good times will come around (MSPBFC).

Respondents' discourse circumscribed a simultaneously collective and individual mentality. Cultural capital is a key concept for interrogating the intricate and complex relationship between vulnerability, risk, and resilience. Many of the narratives rarely made distinctions between their own resilience and that of the community (Fraser et al. 2005; Gregoire 2002). However, the demarcation between their community and "outsiders" is still distinct, insulating them from areas which do not share their same set of social conditions, challenges, and attachment to the region and its lifestyle (Vins et al 2015; Woolcock 2001). While this is a source of strength by creating and maintaining intense social solidarity and community bonds, it also serves to isolate and insulate these individuals and communities from those on the outside (Straub et al. 2020). The nature of a disaster is that it exceeds the affected area's ability to respond to that crisis. Therefore, the insular effects produced by rural stoicism increase vulnerability to hazard events for rural Oklahomans. The complicated expression of cultural capital and the consequent social arrangement will be discussed further in the implications section.

The local economy in Washita is relatively homogenous, relying heavily on agriculture and ranching for sustaining rural livelihoods. A lack of diverse economic sectors compounds the vulnerability influenced by climatic volatility for these

communities (Flora and Flora 2013). Statistics published by the Oklahoma Department of Commerce draw on US Census data to describe a reliance on local industry in these regions. Here, 93 percent of employed persons live and work in the southwestern region of Oklahoma suggesting an overwhelming majority of labor stays in the region, further emphasizing the significance of the local economy. Additionally, approximately 25 percent of the population hold more than a high school diploma limiting economic opportunities for higher paying jobs and concentrating employment in "low-skill," wage jobs (Oklahoma Department of Commerce 2014b). These secondary labor markets generally require less education but also have fewer benefits, higher risk of injury, and relatively low job security. According to Flora and Flora (2013) secondary labor markets—which can dominate rural communities—also encourage outmigration, reducing the quantity and quality of the workforce and consequently, the overall community wealth and financial assets in these regions. This is exacerbated by trends that see younger generations leave these regions in pursuit of better educational (i.e., human capital) and financial opportunities (i.e., financial capital), which not only diminish current economic production but threaten the future of rural life for these communities.

Analysis drawn from respondent interviews—considered along with descriptive statistics from the US Census and the Oklahoma Department of Commerce—suggests that communities in southwestern Oklahoma have a lack of diverse or alternative employment opportunities within Washita, remain isolated from extra-regional industries and labor markets, and consequently show little potential for generating significant increases in tax revenue due to depressed wages of "unskilled" labor and relatively little

financial wealth. Interviewees attested to this dynamic. For those in Washita, the concern is not only reserved for their current situation. Many participants articulated worry, frustration, or even dejection about funding streams or other sources of revenue available for emergency management. Frustrations were directed toward the future implications of the combination of the rigid local tax structure, the lack of opportunities for economic growth (especially in primary labor markets), and the trickle-down funding policy which positions small, rural communities as last in a long queue of potential recipients. The enduring economic crisis at the state level in Oklahoma has led to policy decisions that made severe cuts to funding for social services and programs vital to preparedness, response, and recovery capacities. While these broad economic conditions do affect urban agencies, they impact rural communities the hardest. This reality is acknowledged by emergency management agencies in Oklahoma City who attest that "…smaller agencies, volunteer fire departments, EMS [Emergency Medical Services] groups…are just running on dimes daily trying to buy gas…" Some respondents in Washita recalled some recent upgrades to some equipment (most notably the addition of newer patrol cars and a 911 system) suggesting that, while inconsistent and unequally distributed, the trickle-down funding policy does sometimes reach rural communities.

Rural communities do not receive all of their funding from federal or state levels of government. In fact, the largest contributor to funding rural emergency management is the tax revenue generated at the local level. A combination of low population density, conservative tax policy, and proportionately lower than average income (ODC 2014a, 2014b) provides very little revenue for emergency managers looking to reform current preparedness planning (Straub et al. 2020). In fact, raising local taxes is incredibly

difficult in the state of Oklahoma as it requires a 75 percent majority to increase tax rates—a virtual impossibility even if legislative support can gain traction in such a politically conservative state (Oklahoma Policy Institute 2018). The combination of these economic factors directly affects emergency management's ability to prepare, respond to, and recover from natural disasters in a state that ranks 3rd nationally in disaster declarations from 1953-2016 (FEMA 2017).

Economic conditions collide and facilitate challenges related to human capital which, in turn, compound dimensions of vulnerability in rural spaces. Lack of funding for emergency management (and other social services) in rural Oklahoma means that these agencies are minimally staffed. According to many participants, due to budget constraints communities can rarely staff more than two police officers and many can only afford *perhaps* one paid firefighter. Thus, these communities are constantly strained for personnel to handle routine operations, let alone the significant increase in demand that a natural disaster would require. ODC data indicate that populations in communities in the southwestern region of the state have proportionally fewer people aged 25-45 and proportionally higher people aged 50+ when compared to the State of Oklahoma (this relationship also holds when compared to the rest of the United States) (US Census 2010; ODOC 2014). Population dynamics indicate that even if funding streams did allow for hiring more emergency management personnel, staffing those positions would still be difficult as the average age of Washita's citizens rises. These specific vulnerabilities introduced by the combination of economic and human capitals are reducible to two main points: (1) immigration to rural Oklahoma is rare because of a lack of attractive, well developed, and robust economies in rural spaces; and (2) younger residents who grow up

in these spaces typically migrate out in search of better educational and economic opportunities (Straub et al. 2020).

Extending consideration of financial and human capitals point beyond issues of staffing, emergency management has an increased responsibility to respond to events where an increasingly elderly population needs more help to reach safety and achieve security during a crisis (Ngo 2001). According to respondents, many residents in their communities require special assistance to evacuate to safe places (if they are willing) because of reduced mobility for older residents. Participants also suggest that older residents are less likely to access or utilize newer technologies to be informed about the threat of acute hazards like tornadoes, wildfires, or winter storms (e.g., mobile phone applications and social media) even if connectivity and internet access are available. Lastly, those with chronic medical conditions that require specific, routine, medical interventions (i.e., diabetes, dialysis, oxygen, medication, etc.) require additional planning, assistance, and accommodations when compared to other segments of the population (Ngo 2001).

Overall, vulnerability in Washita is primarily produced through dimensions of financial and human capital (Cutter et al. 2016). A lack of diverse labor markets, a hierarchal funding structure from higher levels of government, a limited localized tax base that is incredibly rigid and difficult to change, and lower than average incomes to draw upon make spending, staffing, and infrastructure planning very difficult for the region. Lack of economic opportunities means that few people are moving into these spaces while attractive educational institutions and labor markets outside the region are drawing younger generations away from rural life in Washita. These dynamics

compound to create further challenges for emergency management to attend to an increasing elderly population that requires additional thought, planning, and care. I now turn my attention to the similarities and differences in how vulnerability is identified in Kiamichi.

5.1.2 Vulnerability in Kiamichi

As with Washita, the foundation for investigating vulnerability begins with understanding the particularity of natural capital. For Kiamichi, natural capital is important for many reasons—some of which differ from Washita. While Washita consists mainly of wide-open plains, Kiamichi has mountains, valleys, rivers, streams, and forests which are very attractive for tourists. The annual Choctaw festival is so popular that one town's population grows from just over 600 to more than 500,000 people for one week in late summer. These individuals usually travel to the region in recreational vehicles and campers to spend time in nature learning, experiencing, and honoring Choctaw traditions and culture. The fragile nature of these temporary housing structures, the lack of emergency management personnel in the local community relative to the massive population increase from the festival-goers, and the unpredictable nature of tornadoes creates a potent cocktail of vulnerability for these small communities (Kolbe et al. 2010). Beyond this week-long event, Kiamichi faces divergent challenges when compared to Washita. The uneven terrain and sheer size of counties in Kiamichi make response a constant struggle. Communications systems (which require line of sight for transmission) are disrupted by a landscape filled with mountains and valleys. These issues also extend to emergency managers trying to coordinate first responders after an

event occurs. Clear connections can be seen between natural, financial, built, and human capitals in the social production of hazard vulnerability.

Symbolically and culturally the fate of the pristine waters of the Kiamichi River are tied to the fate of these communities. Preserving the quality and integrity of this natural resource is also vital for their tourism and agricultural economies. Both of these regions see their natural capital threatened. Kiamichi enjoys more plentiful rainfall than does Washita, so drought is less of a concern in this part of Oklahoma. However, residents in this region have been dealing with a threat of a different kind—dispossession through corporate and political forces. Much of what happens in Kiamichi that influences this area's disaster preparedness is shaped by the battle over water.

First, Dallas came for their water, contending the arrangement of the Red River Compact—which allocates water of the Red River in equal measure to Oklahoma, Texas, Arkansas, and Louisiana—was outdated given the growing population and demand for water in the Dallas-Fort Worth area. According to respondents close to this issue, the water was actually sought for fracking purposes rather than human consumption. This legal effort was concluded by a 9-0 vote by the US Supreme Court in 2013 (*TARRANT REGIONAL WATER DISTRICT v. HERRMANN ET AL*. 2013), preserving water rights for the Kiamichi region. Many respondents argued that this was a direct result of Choctaw sovereignty over this resource traceable to the 1830 Treaty of Dancing Rabbit Creek. Article II of this document ensures the Choctaw Nation sovereignty over the Kiamichi region, including the land, streams, and rivers (Treaty of Dancing Rabbit Creek 1830). This particular political and social arrangement meant that it would be extremely

difficult for municipal, state, or federal entities to acquire rights to this water by legal means.

Next, Oklahoma City tried a different approach and initiated negotiations with Tribal Nations in the region. The proposal was simple: money for water access. As I write this, Oklahoma City has acquired water access to the Kiamichi for the City's purposes (slated to begin in 2030). This is a frightening prospect for many citizens in Kiamichi as this type of arrangement has occurred before with disastrous consequences. Similar agreements giving Oklahoma City access to Lakes Atoka and Canton left those resources destitute and the economies tied to them devastated. One of these "lakes" is little more than an ATV park and one suffered an 80-90 percent drop in economic production according to participants. Rural communities in Kiamichi have seen how beneficial selling their water to the City can be. Cautionary tales such as Lake Atoka and Lake Canton only serve to amplify their mistrust of government intentions and promises for a mutually beneficial agreement (Seigo et al. 2004; Szreter 2002). The battle for water ties natural capital and cultural capital to financial, social, and political capitals.

An interesting wrinkle in the legal authority afforded to the Choctaw over this resource is the exclusion of Oklahomans who do not belong to this group. Lack of adequate political capital in regard to water rights leaves most rural communities in Kiamichi outside of the conversation about who can access their water and what that access means. Politically, non-indigenous communities do not have a voice to levy concerns relative to the amount of water withdrawn, the time period in which this occurs, or to (directly) receive any of the financial payments detailed in this agreement. According to a participant close to these negotiation processes, riparian rights—the right

to withdraw from water sources located within or adjacent to one's property—are neglected or ignored entirely. Violating these small-scale water property rights significantly affects the livelihoods of rural individuals in Kiamichi as they depend on this resource to water their livestock. These local water sources also help emergency managers respond to wildfires using local water sources beyond the reach of water lines, an often occurrence in such a large rural space which have fewer roads and other developed infrastructure.

Political capital, leveraged first by Dallas, and then by Oklahoma City, has shaped the cultural capital in Kiamichi. Even more so than in Washita, respondents in Kiamichi presented themselves as extremely hostile to urban areas and government in general (Gregoire 2002; Vins et al. 2015). They consistently expressed frustration with being targeted, ignored, misled, and manipulated by these larger political forces. One respondent close to the contemporary negotiation over access to the Kiamichi River pointed out that the "experts" employed by Oklahoma City to alleviate the Choctaw's concerns over water sustainability constructed a report that only modelled proposed distribution of water withdraws by the City, which did not account for environmental or social impacts. This respondent felt that this was an intentional omission by parties representing the City's interests and did not meet the expectation of good faith negotiations by Choctaw leadership. This participant resigned their position on the Oklahoma Rural Water Association in protest over these proceedings.

Overwhelmingly, respondents felt neglected and looked down on by urban centers and government officials leading to massive feelings of distrust in those institutions. This distrust was made clear when a participant and former state legislator—who served

during both of these legal battles—did not gain the trust of rural communities until he said "I made a lot of friends with southeastern Oklahomans when I said 'the city looked best in my rearview mirror on my way back to southeastern Oklahoma'." Through development of cultural capital, this antagonistic distrust extends beyond issues of water rights (Seigo et al. 2004). Often respondents implicitly identified insiders and outsiders by using boundary making language. Respondents in Kiamichi would begin interviews by situating themselves by affiliation to village or town—typically using the communal "we"—but also establish their identity in categorical opposition to "them" in "the City." Some places are considered more remote than "rural" by the designation of "frontier" by state officials. The physical distance from the state is mirrored by a conceptual distance articulated through rural identity and community I refer to as the "rural/urban divide".

Clearly, Kiamichi and Washita share similar financial realities. The entire state has a long, deeply embedded legacy of political conservatism, which means lower tax rates and revenue for local municipalities. They also both have to contend with drastic cuts to social programs in light of the state-level budgetary crisis created over the past two decades. They are both subject to the same trickle-down resource allocation policy. While Kiamichi does have a different composition of local economies—leading industries according to ODC data and respondent interviews are tourism, a large state prison facility, manufacturing, and healthcare—they are both characterized similarly by the domination of secondary labor markets and a lack of industry diversity (Flora et al. 2016). One of the main differences between regions is how these conditions are interpreted by community leaders and members. A lack of financial allocations from the state only exacerbates this rural/urban divide. While Washita clearly sees the trickle-

down system of resource and financial allocation as a biproduct of hierarchy and structure, residents in Kiamichi see it as intentional and personal:

> You can go to another small-town our size anywhere in the State of Oklahoma. And the…situation is funding for small towns. Big cities get it…But the funding's just not here for the small communities. And there ain't a community in the state of Oklahoma that won't give you that answer. That is the problem (DGFCANT).

Another emergency manager in a neighboring community echoed this sentiment but with a bit more detail:

> And the bottom line is we don't have the finances or the assistance to get the necessary warning devices…We're affected just like anybody else, but we don't get the attention because we're a small town in the middle of nowhere…. [FEMA] went up there in Moore [a suburban community of Oklahoma City] and they were redoing storm sirens. They got hit, they got hit hard [by an F5 tornado]. They needed that help. But there was so much money poured into [Moore] and the leftover was supposed to be dispersed [but] we couldn't get none of it (DJPOLCL).

During this conversation, this first responder became frustrated, irritated, and even enraged at what he sees as the intentional neglect of his community due to their rural identity, lack of political importance (in the context of state level politics), and distal location. A second respondent who participated in the interview quoted above, described the dire state of their early warning systems. They have a single storm siren built in the 1970s that can only be heard for a few blocks. Wind direction often dictated which side of town could hear the lone siren. Both respondents went on to lament the political opportunism of state level politicians who only appear after the damage is done. After a disaster strikes, politicians flock to the area to offer their support and assure these communities that they will be well taken care of and recover under their stewardship. However, the first respondent went on to say, when the lights die down and the media leaves so too do the government officials along with their support.

The following quote exemplifies the complex reality of multiple forms of capital which converge to shape vulnerability for rural communities in the Kiamichi region:

> For what the state says that have to be, they're minimally qualified to do their job. I've got some friends that's water operators in other towns and stuff, and they're all the time, going to more classes and stuff. These out here aren't. They don't have the money to. You know, it's all about money. You know, if you don't have the money to pay for the classes, you can't go. So ... they're kind of caught between a rock and a hard place [and] we don't have an ambulance here. We lost our ambulance. Two times… The city had one, it went broke. The local police department, it went broke, gave all the money away that they had to pay their employees and operating expenses, and all that stuff. Then we had Pafford EMS in here, and they pulled out because they couldn't make any money. They didn't get enough calls. You know, and, how it is in retirement communities, people living on a fixed income, they had to choose whether to eat, or pay the bills, a lot of times (SMEMBJG).

The respondent begins by introducing the regulatory and financial limitations for maintaining an operational ambulance. Maintaining an ambulance service requires satisfying certification and qualification standards set by the state. Local revenues are insufficient for meeting those initial requirements let alone maintaining those credentials over time. Since the local municipality cannot fund continued training, individual EMTs must pay for continuing education to meet regulatory standards. Other interviewees also discussed this specific ambulance issue. Those interviews add to this quote by suggesting the local municipality cannot afford to even pay a competitive salary for ambulance operators. When public efforts failed, they turned to for-profit entities—such as Pafford EMS. Pafford did not generate enough business from the surrounding area to financially justify their service in the community. Consequently, they ended their contract.

Overall, a widely distributed, poor, and growing elderly population who live on the "frontier" of Oklahoma do not have the financial, political, or human assets to maintain many essential services for disaster preparedness. Many communities have

outdated early warning systems or lack those technologies altogether. In the more illustrative case described above, ambulance services are not available due to combination of the cost of operation, agency regulation, and a lack of trained personnel. Additionally, the distance from hospitals equipped to handle severe medical crises in Tulsa or Oklahoma City—each approximately a 90-minute one-way trip—makes communities in Kiamichi especially vulnerable. Extending the ambulance response time by 30-40 minutes (in addition to the travel time of 90 minutes to the hospital) because a community cannot afford an ambulance illustrates the convergent and compounding nature of vulnerability across multiple dimensions of capital.

Broadly, vulnerability is articulated mostly through economic conditions in rural spaces across Oklahoma (Cutter et al. 2016; Fothergill and Peek 2004). A rigid local tax structure and "trickle down" subsidy policies from state sources provide rural communities few financial resources for preparedness efforts. A lack of industrial diversity and a limited secondary labor market challenges individual household planning in similar ways. Few educational and job opportunities exacerbate these problems as younger generations move out and elderly retirees move in. Consequently, local communities are presented with the dual challenges of fewer able-bodied individuals to assist with response efforts and an increasing elderly population which demands more accommodations for care (Fraser et al. 2005). Remoteness—as an expression of natural capital—compounds these vulnerabilities associated with human capital. The logistics of emergency response from state and federal agencies, as well as the transit time from rural spaces to more sophisticated hospitals and medical treatment, protract relief efforts.

While hazard vulnerabilities in Washita and Kiamichi are owed to similar characteristics—the landscape, distality, cultural ideologies, and financial and human deficiencies in community capital—they are articulated in unique ways. Washita's connections to natural capital vary greatly from those in Kiamichi. The place-oriented context of rural livelihoods articulates similar social relationships with the state but for different reasons. Antagonism about relations with urban areas are expressed with varying intensity based on regional factors and histories (Fetsch 2006; Seigo et al. 2002). Overall, these distinctions of context and nuance matter greatly in how vulnerability is constructed.

However, these vulnerabilities are generalized and aspecific as they relate to the effects of particular hazards. Vulnerability only identifies *potential* harm (Cutter et al. 2003). Disaster requires a catalyst to expose, stress, and shatter the fragile weaknesses in social systems (Wisner et al. 2004). To fully understand the way that those weaknesses are expressed, the unique features and characteristics of hazard agents must be explored. The collision of extant social fragility and the disastrous potential of hazards is best understood through the concept of risk.

5.2 Navigating risk

Vulnerability provides the antecedent social context whereby groups with certain shared social conditions have the potential to experience negative outcomes following a natural hazard. However, vulnerability is not enough to determine those outcomes with any specificity. Risk, situated within an ecological symbolic approach (Kroll-Smith and Couch 1991), takes the pre-existing social conditions and contextualizes them with respect to the unique destructive characteristics of particular hazards (Wisner et al. 2004).

Organizations, communities, and individuals produce knowledge gleaned from society's historical experiences with disasters to convert uncertainties into risk (Beck 1992; Clarke 1999). A rational calculus transforms the unknowable into known probabilities of social harm. By understanding propensities for specific risks, they can be mitigated against, planned for, and, most importantly, controlled (Clarke 1999).

Certainty of risk is certainly unrealistic. An inherent part of risk is that some risks are at best incalculable and at worst unknowable (Beck 1992; Beck 1997). That is, until risks occur and are realized. Relatively recent examples of these gaps in the sequence of knowledge, decision-making, and preparedness about the risk of hazards are abundant. Technological crises at Three Mile Island, Chernobyl, Fukushima, and Bhopal; natural hazard events like hurricane Katrina, the 2003 Moore Tornado, the 2004 Indonesian tsunami; and intentional human acts such as the Oklahoma City bombing in 1995, the 9/11 attack in 2001, and the worldwide financial collapse of 2008 all serve as incidences of disasters that exceeded society's protective safeguards because the knowledge of experts defined these events—and their profound outcomes—as outside the probabilistic matrices of risk analysis (Tierney 2014). These events, and countless others like them, illustrate that risks are not objective but socially constructed. Risk is (re)produced through discourse, policy, decisions made (or not made), and (in)action (Beck 1992, 2009; Tierney 2014, 2019; Wisner et al. 2004). In what follows, explore the discourse of Washita and Kiamichi which constructs community understandings of risk, the organizational policy and decisions which (re)produce risk in these places, and the actions which attenuate or exacerbate those risks.

5.2.1 Risk in Washita

According to participants in Washita, the most salient and concerning hazard events are droughts, wildfires, and tornadoes. Perennial experiences of drought—which present challenges to economic production by impacting crop yields and market prices—also provide optimal conditions for fast moving wildfires. Some respondents also commented on how abundant precipitation in the spring can contribute to wildfires too. Here, they explained that spring rains can increase the development of undergrowth. If high winds and dry conditions take hold in the summer and persist into the fall, this undergrowth provides optimal fuel for wildfires. In this way, hazards (and their effects) themselves are interactive. The protracted nature of drought influences the potential for wildfires affecting the abundance of fuel, intensity, and scope of potential spread. The relatively flat landscape and consistent winds cause conflagrations to spread quickly, move at great speed, and gain intensity that make them nearly impossible to contain, let alone extinguish, for local fire fighters and farmers.

Variability in precipitation combined with the physiographical features of the landscape are not the only conditions that increase risk of particular hazards for Washita. Human decisions also factor heavily in producing risk for these communities (Beck 1992; Clarke 1999; Miletti 1999; Tierney 2014; Wisner et al. 2004). The challenges of agriculture and cattle ranching economies which dominate this region of Oklahoma actually encourage individuals and communities to take on more risk:

> Wildfires are a different story. We have a lot of grass mange around here. No big mountains or anything, but a lot of grasslands that they use for the grazing of cattle. The old style of making fire breaks along your fence rows and everything's pretty well gone by the wayside, because they want to use as much land as they can for the cattle and everything (TCCCISFC).

This human response is intended to alleviate financial vulnerability brought on by the precarity of markets and crop prices. By maximizing the amount of cultivated (or grazed) land to yield the most financial profit, landowners hedge their bets on what they can control versus what they see as random, uncontrollable, natural (and/or divine) phenomena. Most interviewees detailed decisions to pivot from one crop to another based on the price per unit, estimated yields, and precipitation forecasts. For example, respondents talked about choosing to plant wheat in the winter and hay (for livestock feed) in the summer due to the low market prices of other crops (e.g., sorghum, corn, cotton, milo, etc.). The cost of water used for irrigation also makes crops which consume more of it less economically viable, especially during a drought when water restrictions and increased meter rates influence land use decisions. However, interviewees acknowledged that dry land farming practices or choosing to convert cropland to grassland for grazing also creates more combustible material thus increasing the risk of wildfire.

Choices to discontinue the practice of building and maintaining fire breaks—coupled with land use decisions about what to plant—put individuals, neighbors, and community lands at higher risk from catastrophic wildfires:

> …there was a time that we had a lot of cotton, wheat, corn, and stuff like that growing in here and it got to be where it wasn't economical. It was hard to do, so a lot of people went to grass. Then when they done that, it did increase the activity of wildfires, so they became much more prevalent in the area (PPMFC).

When these individual land use decisions become a cultural and local norm (driven by economic factors) wildfires can spread unimpeded from plot to plot, exposing the whole region to higher risk from this specific hazard. Interestingly, respondents spoke explicitly

about these trade-offs. Interviewees acknowledged that their decisions increased risk but were left with little choice economically. In support of these decisions, many respondents mentioned debt obligations that needed to be honored or a cultural aversion to increasing or holding debt at all. They also spoke of individual responsibility for providing for their families and being accountable for their own decisions and subsequent outcomes. Additionally, interviewees were extremely confident in rural volunteer fire departments to respond should a hazard event occur. Unwavering belief and confidence in community response are indications of resilience (addressed later) but also increase risk for these communities due to a focus on response rather than preparedness and pre-disaster mitigation (Newkirk 2001).

Cultural capital clearly is a key contributing factor to the production of risk in Washita. Interview data specifically about hazard risk perceptions seem to be fairly well understood and articulated by respondents. Perceptions about the frequency and severity of wildfires, tornadoes and straight-line winds, floods, earthquakes, winter storms, drought, and severe thunderstorms were remarkably consistent across interviews—demonstrating the value and validity of local experiences and knowledge. There is one notable exception: climate change.

Panel data taken from the MSISNET survey show that approximately half of individuals in the Washita and Kiamichi regions believe in the reality of climate change (Gray et al. 2019). This information gleaned from MSISNET data is mirrored by respondent interviews. The most popular contrarian discourse analyzed in interview data was that of "natural cycles". Many interviewees dismissed the reality of climate change in lieu of a periodic fluctuation in weather. Interviewees often spoke of five- or ten-year

cycles—especially in regard to precipitation and drought. An unshakable faith in climatic stability inherently puts these folks at greater susceptibility of the risks of climate change. This is particularly important for communities in the Midwest and compounded for those that rely on agricultural industries. Models of the economic impacts of climate change for the Midwest and Western United States show that these communities will suffer the most when compared to the rest of the country (Hsiang et al. 2017). Local studies on trends in annual and monthly precipitation provide evidence indicative of these futures (Fernando et al. 2017; Oklahoma Climatological Survey 2015). Given the polarization of climate change as a political issue (McCright and Dunlap 2011), the historical and economic legacy and prominence of the fossil fuel industry in Oklahoma, and the state government's resistance to acknowledge anthropogenic environmental impacts (i.e., induced seismicity) make this ideological construct denying the existence of anthropogenic climate change incredibly dangerous (Gray et al. 2019).

Ideals of self-reliance, pride, toughness, and individuality shape many decisions and behaviors which expose communities of individuals to risk. Paradoxically, interviewees were eager to talk about their propensity for helping others while simultaneously expressing reluctance to accept help themselves. Literature on rural mental health reconciles these contradictions through "rural stoicism" (Bosch 2004; Gregoire 2002; Vins et al. 2015). An insular ideological structure, rural stoicism is founded on boundary making through rural identity, virtues of self-reliance, independence, eternal optimism about the future of rural life, and persistence. Struggle is romanticized as a testament to strong character. Strength that is a source of pride for many respondents. Rural stoicism, remoteness, and a general distrust of government

social institutions at federal and (especially) state levels combine to produce a situation where rural communities do not want to accept external help (i.e., assistance from those ideologically defined as "outsiders").

In my interviews, rejection of external help was expressed in a variety of ways. Study participants viewed planning (at local levels) as unproductive, inefficient, wasteful, and generally unsuitable for the particular conditions of rural life. Emergency management leadership in Washita also invoke this disposition. Officially, according to emergency management interviewees, there seems to be little distinction between hazard specific planning and general emergency preparedness. Many emergency managers choose to respond the same way to any crisis—whether that be a traffic accident or a tornado—rather than engaging in hazard specific planning. While this could be interpreted as myopia, ignorance, or even negligence, analysis of these data suggests these choices are made due to pragmatism. Vulnerabilities in financial capital make spending financial resources on disaster preparedness seem hyper specific and speculative, and thus wasteful. This reality for many communities necessitates fiscal policy to prioritize addressing overall gaps in response and recovery. In other words, communities choose not to invest their few financial assets in what might happen and instead try to finance needs that help them respond to things that do.

Rather than designed, institutional preparedness, Washita's main strategy to combat the risk of wildfire (and other hazards) is community response and personal insurance. In this way, Washita sees more value in the flexibility of adaptive resilience than inherent resilience driven by preparedness (Rose 2007, 2011). This practice resonates with the values of rural stoicism as it places accountability on the agency of

individuals rather than trust in institutions—institutions that are perceived as apathetic and negligent toward rural people, spaces, and livelihoods. Experience with what respondents perceive as poorly funded, insufficient, and wasteful governmental subsidies and interventions in rural areas gives rural communities cause to distrust institutions.

On the other hand, programs funded by the state which do have substantial impacts for rural communities are being cut—further fueling sentiments of distrust and institutional incompetence. According to a few participants, the number of Oklahoma State University Extension Agents—charged with educating agricultural producers on the latest knowledge, techniques, and technologies—are being reduced by one-third (from approximately 150 to 100 extension agents). Many of those experiences, in Washita and Kiamichi, were discussed in the analysis section. Based on these experiences, interviewees chose to put their trust primarily in themselves and their communities, effectively deepening the rural/urban divide. Interviewee experiences, as well as research about disaster outcomes in rural communities (Cutter et al. 2008; Cutter et al. 2016), support the idea that rural communities experience worse outcomes (when compared to urban or suburban settings). In fact, agricultural losses are not explicitly accounted for in federal disaster relief planning (Ash et al. 2013), which serve to confirm stakeholder perceptions that top-down strategies are misaligned or unconcerned with rural community needs. However, closing themselves off to institutions does inherently increase risk to hazards in rural spaces as governmental institutions typically have access to a more diverse set of resources of greater quantity and quality than those typically found in rural areas, as well as a greater capacity to respond to a crisis.

Risk in Washita is expressed through rural stoicism, institutional distrust, and community insulation. It also manifests as a reaction to economic and natural conditions. While most of these are well understood by participants, climate change remains a large ideological blind spot and point of contention for community stakeholders. Cultural capital then informs rural insulation and isolation, affecting social and political capitals. Investing in local bonding social capitals reduces risk due to strong intra- and inter-community bonds at the expense of exacerbating risks related to bridging/linking social capital and political capitals.

5.2.2 Risk in Kiamichi

Factors that contribute to the specific social production of risk for southeastern Oklahoma vaguely resemble those observed, articulated, and analyzed from data in Washita. Institutional-level factors related to financial capital, such as rigid and parsimonious external funding streams from state and federal sources, are evident here as well. The structured nature of local tax revenue available for small scale, local community fiscal budgets is nearly identical to the challenges seen in the southwest region of the state. However, several key differences exist which help to contextualize risk for Kiamichi. First, topographic features complicate preparedness and response efforts for local emergency management. Dimensions of human capital—understood in this case as a relatively low population density spread over some of the largest counties found in Oklahoma—combine with geographic features and elements of built capital to increase risk (Kolbe et al. 2010). The rugged terrain, underdeveloped road networks, and a lack of reliable equipment makes responding to remote crises very difficult. Outdated

police cruisers without four-wheel drive capabilities make it extremely difficult for emergency management to reach those in peril across the vast, frontier landscape. Storm spotters—who serve as the primary source to confirm dangerous tornadic activity on the ground and facilitate early warning systems in ways that radar cannot—are put in a more precarious position than their fellow volunteers in Washita. The sequence of valleys and mountains obscures visibility, meaning that spotters must get closer to areas of meteorological interest in order to accurately identify cloud circulation, funnel clouds, and tornadoes once they reach the ground. Winding country roads lined with trees can disorient drivers trying to position themselves to safely observe tornadoes further increase these risks.

The challenges experienced by storm-spotters is mirrored by increased risk for communities. Tornadoes may remain hidden by terrain or forests, potentially decreasing time of detection or preventing it entirely. When sight fails, the rolling mountains and valleys—which echo, muffle, or otherwise distort aural cues—also confound detection. One respondent articulated the catastrophic potential these risks have for communities stating: "one storm coming through here, some of these people wouldn't recover. Even with the help and the support of a community like ours, it'd ruin us. It'd ruin us" (DJPOLCL). Departing significantly from interviews in Washita, respondents problematized an overreliance on post-event recovery efforts as a means to restore normalcy for communities in the wake of disaster. Neglecting preparedness or mitigation strategies—which are designed to reduce the adverse impacts of disaster—in effect dooms that community. Recovery, by definition, implies the reclamation or restoration of something of value or importance. According to these participants, a significant

disaster, such as a direct hit from a major tornado, will damage the community to such an extent that recovery is either impossible, or financially impractical. As previously noted, this same small community also hosts more than one-half million individuals for the annual cultural Choctaw festival—far exceeding the response capabilities of the two police officers who serve that community. The convergence of cultural tradition, the temporary but monumental increase in population, and the lack of community resources, personnel, and quality infrastructure make this specific scenario not just disastrous but potentially catastrophic.

Increased rainfall in Kiamichi logically makes this region more prone to flooding. Communities situated in valleys suffer flash floods that are incredibly devastating to residents, especially those isolated on the frontiers of communities as poorly maintained or developed infrastructure makes roads and private drives nearly impassable for emergency responders. Ice storms weigh heavily on trees which damage electrical and communication lines, which disrupts power to many residents, sometimes for days or weeks. Local agencies and power companies attempt to mitigate this risk by investing substantially in contractors who routinely trim trees to reduce that risk. All these natural features combine with specific hazards to produce specific risks for the region.

As discussed earlier, risks are also the product of decisions made or not made by human and institutional actors (Tierney 2014). The region's landscape has influenced policy and developmental pathways which are oriented toward tourism, prisons, and healthcare as the major economic drivers for the area (Gramling and Freudenburg 1996b). Crafting local economies around natural landscapes ossifies and perpetuates investment in economic sectors which require these resources, making communities

increasingly reliant on those industries for maintaining rural livelihoods (Murphy and Dunlap 2012). The "rolling inertia" produced by the cyclical relationship between economic development, investment, and human decision-making makes conserving the pristine natural quality of the region vital to community sustainability and survival (Molotch et al. 2000). A lack of locally generated financial resources makes local efforts to diversify the economic industrial landscape in the region difficult. In this way, historic developments in financial capital (driven by cultural capital) increase risks to financial, built, human, and natural capitals (Flora and Flora 2013).

Macro-level institutional forces—most notably the state government—increase the gravitational pull of mono-industrial development (i.e., tourism) fostering conflict, antagonism, and alienation for local communities. Respondent interviews suggest that communities in Kiamichi have creative ideas about expanding economic markets for the region into real estate investment. Many respondents discussed the migratory trends occurring in their communities. As in Washita, young people leave the region to pursue better educational and economic opportunities provided by more developed areas outside the region while older folks seem to move into the area to enjoy their retirement and the outdoors. Developing lakeside property to generate income and property tax revenue seems like a logical course of action. However, the State of Oklahoma owns much of the property around lakes that dot the countryside and is unwilling to make those lands available for development. Other solutions to generate revenue such as a local all-terrain vehicle (ATV) registration fees are implausible. According to respondents, due to the terrain many residents use ATVs to traverse their land and get in and out of town without having to change to a commuter vehicle. ATVs are legally permitted to utilize most

roads so residents living in more remote areas of Kiamichi can make it to town across underdeveloped country roads often maintained by the residents themselves. Due to the politically conservative and inflexible tax structure (recall that increasing tax rates or passing new fees requires a 75 percent approval by the state legislature to pass) frustrate and stymie local decision-makers as they explore innovative solutions to fund local emergency management preparedness efforts.

Together social, political, legal, and economic factors are compounded by the legacy of resource extraction in Kiamichi. Interviewees in Kiamichi consistently spoke of the war for water in the region. Kiamichi's reliance on preserving the natural landscape in the interest of protecting economic survival stands in stark contrast to the threat posed by the state's unceasing interest in obtaining water from the region. Again, as previously discussed, participants in Kiamichi have witnessed neighboring communities suffer as a result of agreements made in the past for places like Lake Atoka and Lake Canton. Fortunately, political power exerted by the state has, in the past, been thwarted by the sovereignty of Tribal Nations. Recently an agreement between the state and Tribal Nations was reached to sell water to Oklahoma City starting in 2030. The protections of sovereignty have had interesting implications for the region. While sovereignty has given Tribal Nations decision-making power over the water in Kiamichi, non-tribal people across the region were left out of the negotiation process—once again excluding the voices of many stakeholders across the region.

Natural capital provides the foundation for building a nature-centric economy focused on tourism and the natural beauty of the Kiamichi region. However, a lack of external funding and a constrained local revenue stream, coupled with state authoritative

control over alternative fiscal prospects for economic growth and policy which would expand and enhance local revenue for social programs like emergency management make economic and fiscal diversity a near impossibility. Underdeveloped built capital in the form of road infrastructure and equipment, combined with a vast frontier landscape, extends response time and increases risks associated with a variety of common environmental hazards. A combination of values centered around natural conservation, a limited budget for emergency management, and a mono-industrial economy—all perceived as outcomes from state intervention, control, and self-interest—accentuates the rural/urban divide. Cultural capital oriented toward outsiders (especially state institutions), is more antagonistic, antipathic, and vehement in Kiamichi as compared to Washita.

The exclusion of local voices from water rights negotiations that seem poised to destroy nearby communities exemplifies the lack of political capital available to local communities at meso- and macro-scales. This only serves to feed the jaundiced perception toward state actors and institutions, intensifying the adversarial relationship between rural and urban communities in Oklahoma. Similar to sentiments in Washita, this perceived abandonment of state and federal institutional support and assistance fosters feelings of isolation in the region. In response, rural communities insulate themselves from the outside—choosing not to invest in linking social capital to external, larger institutions. Instead, they look primarily to one another for support, limiting access and availability of other resources for preparedness, response, and recovery. While insulating themselves from powerful institutions which command a wide array of quality resources seems counterproductive, it actually serves as a source of strength for rural

communities in Washita and Kiamichi. With these risk factors and relational dynamics in mind, I next discuss the innovative and creative social processes that help these communities cultivate resilience to adverse hazard outcomes.

5.3 Cultivating resilience

Resilience is defined as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse effects" precipitated by disaster (NRC 2012:1) and describes the capacity of an individual or group to manage post-disaster impacts (Norris et al. 2008). Early quantitative studies tend to view vulnerability and resilience on a continuum (Tierney 2019). A deficit in one would mean a concomitant increase in the other. However, the community capitals framework articulated through the ecological-symbolic approach suggests these two concepts to be linked yet distinct. This dissertation affirms contemporary scholarship that view the relationship between vulnerability and resilience—while conceptual antipodes—as interdependent, contingent, relational, and context specific (Cutter 2016; Tierney 2014, 2019). As with risk, the factors that produce resilient capacities for institutions, organizations, communities, and individuals do have inherent characteristics but, as described earlier, are also the product of human (in)decision and (in)action. This too affirms contemporary disaster scholarship which views the nexus of vulnerability, risk, and resilience as processual, dynamic, and interactive rather than a static state (Cutter 2016).

Washita and Kiamichi both cultivate resilience in creative and interesting ways. Prior discussions regarding social dimensions of vulnerability and risk for these regions are oversaturated with the presence of macro- and meso-scale limitations imposed by external forces: institutions and governmental agencies. Instead of focusing on changing

these broad dynamics, rural communities in Oklahoma invest in micro-scale efforts and processes at the individual and community level. A strong sense of rural identity, shared social conditions, and intimate community bonds form the basis for cultivating resilience in Washita and Kiamichi.

5.3.1 Resilience in Washita

In my research, much of the discussion about cultural capital has focused on the rural/urban divide, and rightfully so. Respondents often spoke about the differences between rural and urban livelihoods, values, goals, and perceptions held about one another. Discordant boundary-making ideology not only serves to distinguish and define the outgroup but also circumscribes the ingroup with common identity characteristics and a shared set of social conditions. Rather than essentialized categories of identity, distinctive boundary mechanisms which define "us" from "them" provide the basis for collective thought and action (Melucci 1988). Shared conceptions about the virtues of rural identity, the inherent hazard risk of living in Oklahoma, and mutual understanding of the precarity and volatility of rural/frontier life create a bounded solidarity among rural individuals and communities (Marx 1887). Among my interviewees, subtle indications to this shared identity are found in their selective use of pronouns, names, and other more general signifiers. "Us" and "them" designations are common throughout interviewee discourse. When referring to emergency management personnel explicitly, respondents would refer to neighboring officials by first name—suggesting familiarity and social closeness. Many of these conversations included a phone number, directions to an office (or even home), anecdotes about character, and (importantly for an "outsider") the caveat that I would have to "tell them I sent you; they might not speak to you otherwise." In

contrast, emergency managers from the state and federal levels are referred to by their position title, urban location, and/or agency affiliation. The contrast between the familiarity conveyed toward rural communities and the cognitive, and social distance from institutions and urban centers provides a rhetorical indication of social solidarity and the rural/urban divide.

Many participants romanticized the struggle of rural life, describing the challenges they seem to always overcome with pride. For some, this is an inherently Oklahoman characteristic for, as one participant put it, "why else would you live here?" As difficult as life is for many people in Washita, they hold an eternal optimism about making it through challenging situations. Landowners often talked about strategically navigating a volatile market combined with dynamic natural conditions. Those involved in agriculture discussed their decision-making process by rotating specific crops based on drought conditions and market prices. In drier conditions they chose not to irrigate due to the cost and turned to cattle and raising, baling, and selling hay. In wetter years they considered the relative projected yields and estimated crop prices of sorghum, cotton, and corn to decide the most financially optimal course for that season. With the aid of Oklahoma State Extension agents, community agricultural cooperatives emerged to share best practices and new technological or methods to benefit farmers and ranchers. In interviews, respondents discussed the process of choosing specific characteristics of seed cultivars to increase resistance to drought, disease, or insects with incredible technical and horticultural detail. Residents of rural communities must be extremely knowledgeable about their craft, technology, and land to survive in such brutal semi-arid conditions which are generally unfavorable to modern industrialized agriculture.

Respondents were also incredibly resolute about their persevering character. Some participants frame this as faith or religious ideology while others frame it more broadly as a shared set of rural cultural values and attachment to place (FAIZI 2016). These cognitive predispositions serve as both sources of vulnerability and resilience. Individuals are more likely to persist without consideration for leaving, no matter how dire a situation may be.

Beyond shared individual values lies a collective will and dedication to mutual support and community. While self-reliance is an important cultural value, rural communities are well aware of the challenges of facing a crisis on their own. Nearly every interview discussed community support as a virtue and strength. More specifically, the "Oklahoma Spirit" is indicative of their willingness to heed the call from rural individuals and communities managing a natural hazard event. Once again, respondents describe this mentality as uniquely Oklahoman—a product of the lived reality of a rural life in a space continuously under threat from a variety of natural hazards. Describing it as uniquely Oklahoman (the implication being rural) also indicates boundary making language and social solidarity as a biproduct of shared social conditions in a specific place. Interviewees often discussed the compassion of others who race into danger, drawing on their own personal resources to help others in need. While claims of the "Oklahoma Spirit" ring true in this spatial context, these behaviors are reflected by numerous other examples in other places such as a "Cajun navy" after hurricanes Katrina and later Harvey (Meyer et al. 2018). Recognition and gratitude for assistance post-event often starts with neighbors, adjacent communities, religious organizations, and philanthropic organizations such as the Red Cross before talking about state or federal

agencies. Of import here is the category of "adjacent communities." Respondents rarely thank emergency management organizations themselves but instead thank the community as a whole. Rather than suggesting professional duty or obligation this specific rhetorical construction indicates familiarity, social closeness, and "community."

A culture of volunteerism does not only apply during a crisis but, for reasons important for analysis of preparedness, prior to it. According to interviews in both Washita and Kiamichi, all communities have a network of volunteers to address the deficits in funding and professional personnel for local emergency management. Interviewees discussed volunteering in a variety of capacities to serve their communities including 911 operators, EMS, storm spotters, search and rescue, and firefighting. The majority of participants performed multiple roles at the same time. Not only does this provide much needed labor and personnel to emergency management, but intrinsically members of the community who do volunteer receive continued specialized training (i.e., human capital) to make themselves eligible to serve in these roles. This increases local knowledge capacities across the community to cultivate resilience at individual and community levels, raising the collective competency of the entire region. Still others talk about operating in a less official capacity. Respondents routinely shared stories about loading up their trucks—unsolicited—to assist areas during and after a hazard event without mention of departmental or official authorization.

Clearly, one of the biggest challenges faced by rural communities is navigating the lack of financial resources. Lack of money and personnel were the most common and adamant community needs according to respondents. Individually, Washita residents rely heavily on insurance. Insuring their crops, homes, automobiles, farm equipment, and

other assets against loss from tornadoes, straight-line winds, hail, flooding, drought, and ice storms is a tall order. Many respondents in Washita talked about prioritizing which assets to protect through individual informal risk analysis and perceptions based on personal experience and weather projections. State and federal governments also encourage this type of individualized planning. Despite the individualized nature of personal insurance, this too is seen through a collective lens in Washita. A local insurance agent mentioned that during an especially devastating flood in 2011, many residents refused to enter a claim before permitting more elderly or needy residents to process their claims—an exhibition of self-sacrifice and the Oklahoma Spirit translated into financial capital.

A lack of available funds for local emergency management prompts decision-makers to prioritize response over preparedness. By investing in equipment responders need for more routine emergencies (i.e., better uniforms, vehicles, early warning systems, etc.) they can effectively increase their capacity for responding to hazard specific crises as well. This logic extends to other public sectors. A principal at a local school mentioned how they strategically expanded plans for a new building to increase the number of residents who could utilize it as a storm shelter. School buses were also commissioned for evacuation procedures in 2011 after a tropical depression caused widespread flooding in the area. A local technology center conducts preparedness drills for their campus, which is authorized to provide shelter and temporary housing for people affected by hazards. Taking a cue from school administrators in Kansas, local emergency managers were able to construct their own mobile shelters at one-tenth of the cost of those provided by FEMA. Optimizing funding acquired through grants or special state

allocations, is strategic and intentional; these resources are stretched to build resilient capacities in a more dynamic and multi-functional ways than originally intended.

As mentioned earlier in this chapter, some interviewees saw very little value in preparedness. To some degree this is correct—adapting to situations that cannot be accounted for or predicted is a crucial part of adaptive resilience (Rose 2011). However, inherent resilience through mitigation and preparedness planning is also an integral part of resilience. Emergency managers seemed to critique mandatory plans for their "one-size fits all" orientation. According to them, not only are these planning suggestions unilateral and vague in their outline, but they originate from people or agencies outside their communities. Respondents remarked that federal plans are disconnected from the specificity of Washita's rural community needs. Instead of relying on outside agency financial support or planning recommendations, they rely on neighboring communities to help bear the weight. Formal and informal mutual aid agreements exist between communities for mobilizing to an affected area if the call comes in. Many times, they go before receiving the call. As previously noted, more formal arrangements exist between communities and Tribal Nations. In these cases, when one calls for help from the other they are financially compensated for their services. This is a less cordial, yet mutually beneficial arrangement. Here we see cultural, financial, and practical dimensions coalescing to inform human agents' preparedness priorities, relationships, and efforts.

Financial vulnerabilities not only effect local emergency management agencies but individuals as well. In response to these vulnerabilities and risks a local banker created a flexible policy of lending and repayment to help local people navigate tough times brought on by protracted drought or acute tornado. Negotiating collateral and

interest rates, as well as amending loan repayment schedules, are extremely beneficial to local residents who do not have the capital to buy their equipment, seeds, irrigation technology, or pay for distribution during or after a natural hazard. While the rural culture is vehemently opposed to incurring or retaining debt, people understand it to be a necessity due to the rising price of technology (GPS operated combines and center pivot irrigation were the most common technologies mentioned) coupled with stagnant crop prices. This local bank president (and farmer) takes on additional risk by guaranteeing or extending customer repayment schedules in the interest of community survival and sustainability. He articulated this as a moral imperative rather than a business decision—a testament to the cultural integrity, bounded solidarity, and collectivity found across rural communities in Washita.

5.3.2 Resilience in Kiamichi

Cultural capital in southeastern Oklahoma, articulated through the concept of rural stoicism, closely resembles that of Washita. Self-reliance, perseverance, an unwillingness to trust or accept help from outsiders, and a devotion to community and a rural way of life are foundations of Kiamichi's rural identity. Devotion and participation in community through volunteerism are also very apparent here. As in Washita, volunteerism translates into increased human capital by providing additional personnel, training, and a better overall community knowledge of natural hazards. One of the major differences between the two study areas is that while analysis of data collected in Washita suggests that most emergency management personnel are apathetic to hazard specific planning—adopting a more individualized stance toward disaster, Kiamichi views

community preparedness as critical for resilience. Washita gravitates toward response whereas Kiamichi places a higher value on preparedness.

A culture of intra-community support also facilitates a network of inter-community relationships to navigate some of the fiscal challenges imposed on local emergency management agencies. Stakeholder interviews suggest that communities share and pool what little resources they do have to cultivate resilience for themselves, neighboring communities, and the broader region. Emergency management utilizes informal relationships to procure donations of money and equipment to better equip local volunteer fire departments and law enforcement. As discussed in the findings, individuals have donated their personal equipment to the sheriff's department due to deficits in financial or built capital. A larger town was able to obtain and repurpose an old oil tanker for use as a make-shift fire engine. A fire chief, who built a structural fire training facility, offers it to adjacent communities free of charge. All of these are examples of innovative solutions to work around budgetary constraints for emergency management by tapping into cultural and human capitals to convert those strengths into built capital.

When inter-agency cooperation is not enough, the public steps in to assist. Recall from analysis that respondents spoke of a local county store offering their space, generators, and other pieces of equipment to provide a control center for a local police department that was without power during a crisis. One discussed a water disposal company deploying a water truck and the water to assist with a major fire at a lumber company in an hour of need—no recompense was required. A few respondents talked about partnerships with local jails and prisons to bolster their pool of personnel available

to assist after a hazard event. According to these participants, such partnerships have been imperative for cleanup and recovery operations.

Similar to Washita, isolated examples demonstrate the importance of local banking operations to reduce community vulnerabilities to deficits in financial capital. Here, partnerships between a local bank, local agricultural educational institutions, and regional communities have created a program designed specifically to address current and future human and financial capital vulnerabilities. Focusing on local economic development through subsidizing and training youth in animal husbandry and livestock production addresses two problems: economic development and out-migration of youth. By creating inroads to a profitable business for future farmers and ranchers, banking-educational partnerships could have a dramatic impact on generating wealth, tax revenue, and livelihoods while creating a pathway for future generations to build a business and family in the region. Programs like these integrate well with the elements of cultural capital—most notably common values of self-reliance and traditional livelihoods—to produce a community generated path to economic development, diversity, and independence.

Built capital, particularly preserving or building critical infrastructure, is a key concern and vulnerability for Kiamichi. Analysis of built capital suggests that many communities lack early warning systems. With few other options, some respondents described deploying squad cars to drive up and down streets in town to notify the public when a tornado warning is in effect. They also helped to personally pick up and escort elderly individuals to storm shelters. While the roads themselves are poorly maintained in remote locations, local power cooperatives and contractors work hard to preserve

infrastructure and prepare for severe storms which threaten power distribution for the region. Dedicating significant resources to managing forests that line much of the roads and power lines also help to preserve infrastructure. Forest management through trimming and scheduled controlled burning programs also helps to mitigate occasional wildfires. While high-speed internet and connectivity is still sporadic at best, power companies and emergency management utilize social media—such as Facebook and twitter—as a low-cost alternative to more expensive communications networks. Some storm spotters I interviewed mentioned livestreaming from these platforms while chasing storms to provide live, up to date information on potential hazards. While respondents did say these technologies have helped local communities disseminate information and communicate with the public, it does have limitations. Many older residents have little knowledge or willingness to use these resources, isolating a significant portion of the community. By enhancing resilience for much of the population, it also potentially exacerbates vulnerabilities and risks for others if these tactics become the primary means of emergency communication—particularly for those in remote or frontier locations with an inconsistent connection (if one exists at all), those who cannot afford newer technologies or services, or those resistant to embracing those technologies.

Most of the processes of turning community vulnerabilities and risks into resilient capacities have one common factor that underlies them: social capital. Historically, like in Washita, external institutions are perceived as unreliable at best and malfeasant at worst. In Kiamichi, the tone and disposition toward state governments is much more emotive. Antipathetic rather than apathetic. Instead of investing time and energy into linking or bridging social capitals, they focus on enhancing bonding social capital—

closely linked and geographically localized social networks with a shared set of social conditions. These networks provide access to resources that are of comparable quality, but due to the large gaps in equipment and personnel found in many Kiamichi rural communities, having *any* resources to draw on builds capacities of resilience. Emergency managers lean on one another, informally in some cases, to bring their collective interests, assets, and motivations to bear during a crisis. Individuals in the community lend their own property, bodies, and time to these efforts as well.

Community-oriented planning also exists in Kiamichi that differs significantly from Washita. While all counties and emergency management agencies in Oklahoma are required to have some sort of disaster/emergency plan, few have one as detailed and as participatory as the Harris Mitigation Plan (HMP). With two distinct segments, the detailed emergency plan contains community-sourced strategic action plans for what response looks like, what their capabilities are, and a clear yet flexible leadership structure. The second part of the plan involves future community investment opportunities and projects. The former focuses on transparency, community engagement, and clear communication while the latter is oriented toward continuing to build capacities of resilience in the future. This accomplishes a few things. First, it involves the community. Avoiding the pretention and disdain for top-down planning, the community is charged with accountability for disaster preparedness. Periodic meetings ensure that community stakeholders are involved with routine planning. The HMP also avoids pitfalls of complacency. A ledger of future projects keeps communities focused on development and progress rather than contentment. Respondents with intimate knowledge of the HMP described widespread community support, involvement, and

engagement. Last, taken as a blueprint for other rural communities, HMP offers both inherent and adaptive resilience. Expertise is presented, recommendations are offered, and communities decide what is best for them. The HMP increases individual and collective agency over emergency preparedness while being situated in emergency management expertise and hazard specific knowledge (Koch et al. 2017). It fosters community bonds and trust in leadership. It provides access to grant writers to procure project specific funding without the burden of extra-community constraints on the way those dollars can be allocated. All of these align with disaster scholarship that emphasizes the importance of community driven disaster planning rather than top-down approaches (Cutter and Emrich 2013; Koch et al. 2017; Niekerk, Nemakonde, Kruger, and Forbes-Genade 2018; Tierney 2019). It should be mentioned that the HMP is only found in a single county in southeastern Oklahoma and other plans discussed throughout the region have an enormous amount of variability. At worst, some respondents described no hazard specific plan at all (that differed from responding to any crisis). The HMP should not be taken as typical but an aspiration for rural communities in Oklahoma.

In this discussion I have systematically compared and contrasted the social development of hazard vulnerability, risk, and resilience for two distinct regions in Oklahoma. Challenges related to a lack of financial resources and critical infrastructure contribute heavily to rural perceptions of isolation which facilitates insulation. Hazard specific risks introduce divergent issues for each region based on dimensions of natural capital, relations to urban centers or institutions, and external threats to rural livelihoods. Despite these challenges, rural communities show remarkable determination and

dedication to their communities and ways of life. They utilize what little they have to profound effect.

This discussion continues to develop knowledge about the social production of vulnerability, risk, and resilience in rural spaces. More than independent social indications of potential disaster outcomes, findings herein demonstrate the relational affinities that complicate, influence, and drive these three critical concepts in disaster scholarship. Moreover, findings and analysis articulate the importance of specific place-based meaning systems in shaping perceptions, discourse, decision-making, and actions for rural communities as they attempt to navigate social vulnerability, mitigate risk, and cultivate resilience. The following section will discuss the limitations of this study.

5.4 Limitations of this research

As part of the larger, five-year Oklahoma EPSCoR project (2013-2018) that focused on the effects of climate change (potential or realized), the research design, data collection tools, and aims of my study were not designed to focus specifically on disaster preparedness—although they did lend themselves toward that end. During my own involvement in this research project, (2016-2018) a post-doctoral fellow and I revised the interview guide (see Appendices II and III) to (1) focus interviewee attention on each specific hazard rather than asking respondents to recall experiences from any hazard and (2) to include more questions related to water in the Kiamichi region. The first revision was designed to capture more breadth and diversity in interviewee responses which detail experiences with a variety of hazards. This also mitigated against the possibility that respondents might key on first, last, or selective experiences related to specific hazards mentioned. Asking each participant for experiences related to each hazard, in our view,

led to more robust and holistic data indicative of which hazards were more prevalent and of greater concern to interviewees. The intent of the second revision was to include additional qualitative data to be shared with hydrologists also working in the region as part of the EPSCoR project. Including additional questions, especially regarding a politically and culturally volatile topic such as water in southeastern Oklahoma, led to a significant discrepancy between the length of interviews in Washita when compared to Kiamichi.

The interviewees for this dissertation were also purposefully selected due to their affiliation with emergency management services. It stands to reason that emergency management personnel may be guarded or even potentially self-aggrandizing in their depiction of emergency management effectiveness in order to protect individual or organizational reputations (Clarke 1999; also see Coombs 2007 for an in-depth discussion). It seems plausible that emergency managers would deflect fault from themselves, their department, organization, or community to other external actors (Cope, Slack, Blanchard, and Lee 2016; Straub 2020). However, the consistency of narratives across regional and super-regional scales of analysis, coupled with interview data provided by landowners, mitigates potential elements of social-desirability bias.

Qualitative stakeholder interviews did not directly include the voices of those part of tribal communities—especially as a distinct social category for analysis. Original designs for the project did intend to focus a segment of the project on tribal voices. Several focus group interviews were conducted, recorded, and analyzed. However, tribal nations were not included as a distinct social group due to a number of factors: (1) a change in the post-doctoral fellow who had entrée into an Oklahoma tribal population as

well as expertise in indigenous studies; (2) a lack of data collected from the few focus groups that had been conducted; and (3) the timeline of the EPSCoR project combined with the IRB entrée processes in order to work with indigenous people. Interviews that did exist, while interesting and compelling, were not substantial or numerous enough to be included for analysis. Future research should intentionally center analytic focus on native voices and unique preparedness dynamics for tribal communities in Oklahoma.

CHAPTER VI

CONCLUSIONS

This dissertation, using the CCF and qualitative methodology, highlights the importance of a place-based, ecological-symbolic approach to understanding the nexus of hazard vulnerability, risk, and resilience by focusing on two distinct regions of rural Oklahoma. The frequency, severity, and diversity of hazards for this part of the United States makes it particularly valuable and amenable to scholarly inquiry. Moreover, this dissertation focuses on rural communities and the issue of preparedness—two oft-neglected areas of study for disaster scholars (Cutter et al. 2016; Meyer 2018; Ritchie and Gill 2011; Tierney 2014). The final chapter of this dissertation summarizes the findings pertaining to my research questions. Next, I discuss the scholarly and practical implications of this dissertation including: broad theoretical contributions, the utility of the CCF for hazard and disaster research, and practical strategies and best practices for cultivating rural resilience. I conclude with commentary on what potential futures look like for these rural communities.

(1) *Referencing the Community Capitals Framework (Flora and Flora 2008), what factors are associated with vulnerability, risk, and resilience to environmental hazards in rural Oklahoma?*

The most salient factor which contributes to vulnerability in rural Oklahoma is financial in nature. Financial capital is one of the most convertible forms of capital for any community. Monetary assets are easily converted into many forms of capital which can reduce vulnerability—most notably infrastructure, equipment, personnel, and training. A tradition of conservative, austere economic policy severely limits the ability of communities to financially invest in critical resources. Local funding streams—largely influenced by state-level tax policy—contribute little to parsimonious external funding. Staffing shortages, inadequate infrastructure, and cuts to social programs are significant obstacles for rural communities to overcome (Cutter et al. 2016; Flora and Flora 2008; Newkirk 2001). Little diversity in economic production also increases vulnerability as these regions possess little incentive for future generations to stay and little prospect for economic prosperity for most rural communities. Outmigration of younger generations is coupled with an inflow of retirees. This intensifies vulnerability as increased healthcare needs, decreased mobility and physical competence, and a lack of technological literacy add additional community challenges for disaster preparedness, response, and recovery (Flora and Flora 2008, 2013; Ngo 2001). According to analysis, these historical conditions and contemporary issues are the product of cultural relations—most notably the rural/urban divide experienced and understood as community disenfranchisement. Grounded in rural stoicism and developed through a reciprocal, mutually reinforcing relationship of animosity and perception of broken expectations has widened this divide. This dynamic is not uncommon in rural communities under threat of hazards:

> …the victims' fatalistic perceptions of the mudflow did not end up with passive responses in their recovery process. Rather, the passivity was stemmed from the structural powerlessness led by the unassertive responses of the government in managing the compensation of "buy-sell" formula for the victims. (FAIZI 2016: abstract).

Community disenfranchisement leads to isolation and insulation increasing vulnerability and exacerbating risk. Overall, the cognitive, cultural, social, and geographic distance between rural communities and urban centers contributes significantly to increasing hazard vulnerability and risk in rural Oklahoma.

(2) *How do rural Oklahomans perceive risk individually, in their communities, and in their region more broadly? How do these perceptions differ across Washita and Kiamichi regions?*

Interview data demonstrates that rural individuals have an incredible understanding of their individual and community vulnerabilities and hazard-specific risks. Participants—emergency managers, landowners, and public officials—in each region show remarkable consistency in identifying social vulnerabilities and the unique hazard risks experienced in their communities. A lack of educational and economic opportunities, changing demographic trends, and experience with a variety of hazards were clearly connected in respondent interviews. Respondents in Washita understand their predisposition toward intense wildfires, unpredictable tornadoes, and the regularity of drought conditions as significant obstacles to rural life in communities which rely on the land for their financial wellbeing. Kiamichi interviews articulated the dangers of frontier livelihoods under threat from tornadoes, floods, and ice storms. However, local knowledge is problematically divided on the potential implications of climate change which have already began to manifest, particularly in Washita as drought conditions become more severe and protracted. Elevated risk of drought increases economic

vulnerabilities in southwestern Oklahoma who rely on agriculture and ranching industries. Increased drought risk also compounds risks associated with more frequent and severe wildfires. Broadly, interviewee risk perceptions are helpful for hazard mitigation but areas of opportunity exist for rural extension agents and other social institutions (such as the Church) to bring the realities of climate change to bear on the cultural mindset to institute positive change and attenuate risks associated with our changing climate (Gray et al. 2019; Viegas and Meek 1998).

(1) *How do communities in rural Oklahoma plan and prepare for, as well as mitigate the risk of exposure to environmental hazards?*

In spite of parsimonious economic conditions and community disenfranchisement, rural communities are very resourceful, innovative, and adept at cultivating capacities of resilience to hazard vulnerability and risk (Flora and Flora 2013; Koch et al. 2017; Straub et al. 2020). Collective feelings of animosity and distrust of urban centers, politicians, and government agencies creates a shared sense of bounded solidarity (Seigo et al. 2004; Vins et al. 2015). A culture of volunteerism and empathy toward other rural communities strengthens intra- and inter-community bonds. Mutual aid agreements and memorandums of understanding are created formally and informally to navigate deficits in fiscal budgets and emergency management personnel. Close-knit, intimate community relationships produce emergency managers who know their community members (and their individual propensities to experience vulnerability and risk) and aid first responders in ascertaining the needs of their constituency. Community members, with knowledge of resource limitations imposed on emergency management, readily volunteer themselves and their properties in times of crisis. "We do the impossible with nothing" becomes a sense of pride in these communities, forged through

trepidation. Yet, despite building these creative solutions to cultivating capacities of resilience to natural hazards, the insulation by way of resentment closes them off to social networks that might attenuate challenges associated with deficiencies in financial, political, human, built, and linking and bridging social capitals.

6.1 Implications of this research

The study presented here contributes knowledge about the social production of vulnerability, risk, and resilience in rural spaces (Cutter et al. 2016; Koch et al. 2017). More than independent social indications of potential disaster outcomes, findings herein demonstrate the relational affinities that complicate, influence, and drive these three critical concepts in disaster scholarship (Wisner et al. 2004). Moreover, findings and analysis drawn from the current study articulate the importance of specific place-based meaning systems in shaping perceptions, discourse, decision-making, and actions for rural communities as they attempt to navigate social vulnerability, mitigate risk, and cultivate resilience (Kroll-Smith and Couch 1991; McCormick 2012). In the next section, I discuss the implications of this dissertation in two ways: academic contributions to existing scholarship and the practical utility of this study for rural communities.

6.1.1 Scholarly implications

Broadly, findings of the current study reaffirm the social and invisible nature of disasters' effects (Vyner 1988). Given the threat of hazards in Oklahoma, discourse from respondents detail the myriad ways in which disaster planning for response, recovery, and

(particularly) preparedness permeates community mentality, culture, decision-making processes, and social (inter)actions. The cultural and social ubiquity of hazard knowledge and experience demonstrates that constituents in rural Oklahoma are not only impacted by the occurrence environmental hazard events, but the looming threat of disaster is embedded into everyday livelihoods. These findings also confirm contemporary perspectives of disaster that emphasize the importance of preparedness by considering social costs as well as tangible ones (Erikson 1976, 1995; Gill 2007; Gill et al. 2012, 2014; Gill et al. 2016; Ritchie 2004; Rodriguez-Diaz 2018).

Insights gained from this project also help to refine traditional ideas of how risk operates in disaster scholarship. For example, Beck (1992) understands risk as an inherent part of the continued modernization of society. The ways in which institutions are charged with attenuating risk is typically articulated through capitalist processes, which accept certain levels of risk in order to foster continued economic growth at the cost of "acceptable" losses (Beck 1992; Kroll-Smith 2018). However, some places do not have the luxury of deciding which risks to accept to optimize the relationship between loss and profitability. Instead, these individuals and communities must assume disaster risks in the interest of survival. Accepting risk is less a social compromise than a financial necessity. The introduction of "necessity" complicates macro-level theoretical ideas of risk related to "acceptable losses."

A rational probabilistic calculation of risk means little if communities do not have discretionary dollars available to allocate toward pre-disaster mitigation or preparedness planning. Necessity, in this context, holds significant potential for environmental justice scholarship attendant to the unequal distribution of environmental burdens. Risk

scholarship that constructs risk as a unilateral social problem is overly simplistic and neglects the plurality and contingency of risk as Elliott (2002) describes: "the postmodern emphasis on the multiple, fragmented, discontinuous, and local implies that all attempts to fashion a master discourse of [risk] society are illegitimate" (311). Understanding risk as contextual and the product of social power also affirms the importance of the ecological-symbolic approach to understanding the disaster process (Kroll-Smith and Couch 1991). Scholars should continue to investigate the multiplicity and contingencies of the development of hazard vulnerability, the social (re)production risk and the effects of these contingencies when risks are realized as disaster. A nuanced approach to deconstructing the complexity of social relations which shape hazard vulnerability and the production of risk will aid scholars in developing tailored community-oriented strategies for cultivating resilience (Ash et al. 2013; Cutter et al. 2008; Norris et al. 2008; Van Niekerk et al. 2018).

The nexus of natural hazard incidence, climate change, and community resilience proves to be especially problematic for the rural communities in the Midwest (Cutter 2020; Hsiang et al. 2017; Polain et al. 2011; Shafer et al. 2014). The New York Times published an article identifying Oklahoma as a state at "highest risk" for natural disasters (The New York Times 2011). Environment America (2013) published a report detailing that between 2007 and 2012 large sections of Oklahoma experienced the highest incidence of natural hazard related disasters in the entire United States. These news media claims are confirmed by federal statistics which rank Oklahoma (79) third, following only California (81) and Texas (94), in major disaster declarations since 1953 (FEMA 2017:11).

Several key factors emerged from analysis that are essential for considering the state, development, and momentum of community hazard vulnerability, risk, and resilience in rural Oklahoma. The foundation of these relations is what I refer to as community disenfranchisement. Animosity directed at urban centers, state and federal governments, and political figures is the product of historical relations across the rural-urban divide. Owing to a variety of factors including: geographic and cognitive distance; class and livelihood difference, economic conservatism, or a lack of political power, the perceived detachment from rural issues and needs is overwhelmingly apparent among interviewees (Peters et al. 1997). Feelings of community disenfranchisement are not static or fixed, but relational. An historical legacy of conservative economic policy has led to an enduring and substantial economic crisis in Oklahoma that trickles down to affect rural community funding streams. Financial cuts to social welfare programs, inconsistent federal funds for disaster preparedness or response, a deteriorating educational system, and dilapidated infrastructure have become societal expectations rather than symptoms of a temporary political or economic shortfall. All of these financial issues exist in tandem with the persistence of a variety of natural hazards in Oklahoma.

However, community disenfranchisement is not simply the product of history but continues to evolve through time. As historical political, economic, and cultural divisiveness persists through contemporary interactions, community disenfranchisement intensifies. If each social exchange confirms this social condition in rural places, vulnerability and risk intensifies. The distillation of resentment and isolation manifests as reactionary social insulation, further exacerbating these conditions and social

relationships (Straub et al. 2020). Research focusing on the "rural-urban interface" holds enormous potential for crafting strategic interventions to sever the iterative processes which feed community disenfranchisement (for examples see Ros-Tonen, Pouw, and Bavinck 2015). However, some of these studies still adopt a top-down perspective on management, governance, and (therefore) hazard mitigation planning (Beringer 2000). Post-modern or place-based scholars might have much to contribute to this burgeoning interdisciplinary field.

6.1.2 Utility of CCF in the context of hazards and disasters

The multidimensional CCF shares many qualities with other frameworks designed to measure hazard vulnerability. Perhaps most well-known, the Social Vulnerability Index (SoVI) (Cutter 2003; Cutter et al. 2003) provides detailed county-level information missed by national or regional level frameworks (such as the Disaster Deficit Index, the Local Disaster Index, and the Prevalent Vulnerability Index—for detailed discussion on these frameworks see Cardona 2010, 2011). The power of the SoVI (and its many iterations) is in its ability to consider social as well as economic factors for ascertaining hazard vulnerability. However, the exclusive quantitative emphasis of the SoVI has been scrutinized by scholars who argue that it assumes a one-size-fits-all approach that privileges economic factors and is biased toward more-developed countries (Rygel et al. 2006; Cutter 2016b). Community-level resilience measurement frameworks (such as the Baseline Resilience Indicators for Communities developed by Cutter, Burton and Emrich (2010) and the Communities Advancing Resilience Toolkit developed at the University of Oklahoma and outlined by Norris et al. (2008)) advanced comprehensive theoretical understanding of factors that contribute to community resilience. These too were

primarily designed for cities, making them less appropriate for measuring resilience in rural areas.

The power of the community capitals framework is in its holistic and community-generated approach to cataloguing and measuring factors of resilience specifically for rural communities (Flora et al. 2016). Moreover, the categorical dimensions of capital provide an easy formula for scholars and community leaders alike to catalogue, monitor, and evaluate community strengths and weaknesses. Utilizing the CCF in the context of disaster resilience makes theoretical and practical sense (Mayunga 2007; Ritchie and Gill 2011). CCF inherently positions each category of capital in relation to all others. This allows for dynamism and interdependence between forms of capital without privileging any specific type of capital or any single configuration of all of them. Given this last point, CCF in the context of disaster research lacks a substantial empirical basis for disaster-specific theorizing. This dissertation is one of the first such empirical works to adopt this framework (see also Koch et al. 2017 and Mayunga 2007 for other examples). While Flora and Flora's (2008) original framework does highlight trends in capital conversions, relationships, and patterns in rural communities, disaster-specific theorizing within this analytic framework is still developing. What this dissertation contributes are indications of those theoretical developments (specifically in the concepts of community disenfranchisement and the formation of constellations of bonding social capital). Furthermore, and more significantly, the methodological approach employed here is novel and specifically designed for a community-oriented approach to studying disaster preparedness and the nexus of hazard vulnerability, risk, and resilience.

In the present study, deductive analysis (categorizing respondent discourse into theoretically established categories) was complemented by subsequent inductive analyses (organizing discourse within each category into emergent themes) to demonstrate the perceptions, decision-making processes, and consequent actions relative to each form of capital. Using both deductive and inductive/emergent methods of qualitative analysis in this sequence allowed for conceptual refinement of distinct forms of capital. For example, analysis of built capital revealed that the respondent interviews often gravitated toward equipment as a need for communities rather than new or improved infrastructure (which respondents viewed as financially impractical). Linking social capital and political capital also share many characteristics. Political capital in particular remains a challenging concept to identify and measure (this is acknowledged at length by Flora and Flora 2008, 2013). Future research should continue to refine what constitutes these forms of capital, their tendencies of conversion into other forms, and community stakeholder perceptions on the value of these processes.

The current study took the relations between forms of capital as the primary focus of analysis in ways that other uses of CCF have not (Ritchie and Gill 2011). Adopting this methodological approach to include more complex qualitative methods (such as semiotic or discourse analysis) could generate compelling research about the unique pathways through which individual, community, and institutional relationships emerge, develop, and evolve through time. Additionally, these relationships inform the unique configuration, development, and evolution of community capitals. Potential applications of these studies can perhaps better inform interventions to sever the loss spiral of community disenfranchisement and contribute significantly to community-oriented and

place-based disaster preparedness (McCormick 2012; Peters et al. 1997; Ritchie et al. 2013; Smith et al. 2018), rural-urban interface strategies for governance (Lavell and Maskrey 2014; Newkirk 2001; Ros-Tonen et al. 2015), and how to cultivate social capital holistically across linking, bridging, and bonding types (Petzold 2016; Ritchie and Gill 2007, 2018; Straub et al. 2020).

However, the CCF is not without its drawbacks. Conceptual fuzziness of certain forms of capital can make mutual exclusivity a problem for accurate measurement—especially for quantitative or statistical analyses (for effective quantitative analysis using the CCF see Mayunga 2007). Also, the degree to which practitioners can disentangle the effects of one type of capital on others can lead to complications for analysis. Diligent qualitative methods and analysis—as well as the use of a software program like NVivo 12—provide the tools necessary to hedge against these theoretical and methodological challenges.

6.1.3 Practical implications for rural communities in Oklahoma

Personal insurance, volunteering, training, and mental labor (i.e., emotional and financial stress as well as litigation/relief processes) are part of everyday life for communities in Washita and Kiamichi. Vast amounts of community time, personnel, and personal resources are dedicated by individuals to help mitigate the substantial risks of hazards faced by their communities. Washita chose to dedicate those resources toward adaptive resilience (i.e., response and recover) while Kiamichi elects to invest in all facets of disaster planning (i.e., preparedness, pre-disaster mitigation, response, and recovery). However, according to many participants, external funding for community

uses related to hazards and disasters are dominated by those dedicated to recovery of property:

> While structured pathways and access to funds for emergency management do exist, funds are "provided to primarily address the repair and restoration of public facilities, infrastructure, or services which have been damaged or destroyed" (OEM 2018: https://ok.emgrants.com). The language here suggests that funds are earmarked for recovery, not preparedness (Straub et al. 2020: 111).

Federal and state institutions prioritize economic relief rather than social or community preparedness. This rationale seems illogical given the degree to which preparedness strategies could reduce the financial burden to relief programs and, more importantly, the full-cost of disaster (Gaddis, Miles, Morse, and Lewis 2007).

The nature of how disasters are understood through contextualized cultural meaning systems contributes to the ways in which communities understand disasters and what decisions and actions should be (and are) taken to mitigate the risks associated with them. Interviewees expressed a lack of faith in urban areas and institutions that approached anticipation or even expectation rather than disappointment[8]. This suggests that rural communities have been conditioned to *expect* state and federal non/malfeasance in times of crisis—unless assistance is motivated by political, economic, or personal opportunism. The expectation of institutional negligence is part of the cognitive and cultural fabric in rural communities denoting "recreancy" or "the failure of institutional actors to carry out their responsibilities with the degree of vigor necessary to merit the societal trust they enjoy" (Freudenburg 1993:909).

[8] This thread of inquiry closely aligns with scholarship on the concept of "recreancy" (see Freudenburg 1993; Ritchie et al. 2013; Ritchie et al. 2021; Straub 2020 for examples).

Community disenfranchisement resembles reluctant resignation in that the lifescape of rural communities is fundamentally altered. Irreparable negative changes in community organization, operation, and prosperity following a hazard are reluctantly accepted as a new way of life (Ritchie 2004; Ritchie et al. 2013). However, community disenfranchisement differs significantly from reluctant resignation in that it does not require a hazard event to alter individual ontological security (Giddens 1991) or community lifescape (Edelstein 2004). Instead, the ever-present threat of hazards and the expectation of future institutional failure should a disaster occur is incorporated into the social psyche. Rural communities *know* they are on their own. This analysis demonstrates the relational effects between forms of capital. In this case, cultural capital—specifically community disenfranchisement—has three interesting implications for the development of community capital.

First, community disenfranchisement informs the perception of and investment in specific forms of social capital. Linking social capital (again, the social networks that bind groups of unequal power) is preserved in an objective sense. Explicit connections between federal and state emergency management agencies do exist for rural communities. In fact, some of the relationships between state officials and rural communities are very cordial and well respected. However, rural community interviewees disassociated the person providing service from the institutions and agencies they represent. Rural communities trust that the ODEM representative will do all they can to assist their community but believe those individuals operate within an incompetent system. Telling here is not the objective existence of different types of social capital, but the subjective decision-making processes that shape which types of social capital will be

utilized during a crisis: “It is not just the quantification of the social network or its connectivity, but rather how such networks can be mobilized to benefit the community” (Petzold 2016:116).

Community disenfranchisement precipitates a lack of trust and reciprocity in linking social capital to government institutions. Bridging social capital as a means to access other, diverse forms of capital in greater quality and quantity—articulated as social networks between rural communities and urban centers—is abandoned for the same reasons. These choices are legitimated by the social interactions between emergency managers and urban populations—the reader might recall that hospital representatives in these urban centers in fact blamed frontier emergency management for Oklahoma’s low ranking in medical care, inferring a causal relationship between rural identity or attitudes and relatively poor medical outcomes. This, in turn, intensifies antagonism toward outsiders creating a mutually reinforcing social animosity across the rural/urban divide. Instead of developing linking or bridging social capital, community disenfranchisement leads to the continued investment and intensification of bonding social capital.

The current study highlights grounded strategies for cultivating disaster resilience in rural spaces. According to analysis, rural communities do, in fact, rely on community capital more so than economic capital to cope with disasters (Cutter et al. 2016). More importantly, the current study emphasizes the diversity in how rural spaces understand and attend to risks associated with place-specific hazard events. Rural communities are not monolithic. In fact, “In the twenty-first century, rural communities differ more from each other than they do, on average, from urban areas” (Flora and Flora 2013:3).

Analysis of data from the current study demonstrates that local perceptions, decision-making, and priorities are constructed through social processes such as cultural norms, local experiential knowledge, the local economy, density of quality infrastructure, and the unique demographic characteristics of communities. Overall, economic path dependence, the hazard dynamics endemic to the physical landscape, and the preexisting social conditions of local livelihoods are incredibly influential to the social construction of hazard risk. Place-specific factors mentioned here inform community strategies to navigate hazard vulnerability and risk. The most distinctive difference between disaster planning in Washita when compared to Kiamichi is the value placed on preparedness.

Expectations of recreancy and lack of institutional support cause communities in both regions look to one another, abandoning government institutions (Straub et al. 2020; Straub 2020). A shared set of social conditions creates bounded solidarity between people experiencing rural life and fosters high levels of trust and expectations of reciprocity (Marx 1887). Communities rely on intra- and inter-community bonds for support and assistance. Formal mutual aid agreements as well as close familial and social relations between adjacent communities form constellations of bonding social capital (Straub et al. 2020). The "Oklahoma Spirit" and a culture of volunteerism provide a dedicated, well trained, and highly motivated support system for rural communities that can be trusted. Expectations of reciprocity hardly need mentioning. Interviewees often detailed circumstances where they race head-long into danger because "…one reason we like to volunteer because usually when the fire whistle blows it's usually going to be on one of us" (KBFC). When the impacts of a hazard event exceed the capacity of a community to meet those needs emergency managers reach across to other communities

who share the same challenges. Putnam (2000) detailed these relationships in his pivotal work on social capital: "Internally, associations and less formal networks of civic engagement instill in their members habits of cooperation and public-spiritedness, as well as the practical skills necessary to partake in public life" (338). Rural communities collectively organize and deploy personnel, equipment, and other resources to assist and support other communities in need:

> Of course, we do partner with, for instance, Grady County sheriff's office. They're eighteen miles from us. All of the contiguous counties around us, we all work together because none of us got enough manpower, equipment, money, anything. If we get something way over on the west side of the county, the county west of us will come over and help. If we get something on the east side, they come over and help. We do the same with them. Mutual agreements and MOU's, memorandums of understanding are really important in Oklahoma because nobody, none of the rural areas have enough money. They just cannot brave by their self (LMASFC).

Constellations of bonding social capital analytically differ from bridging social capital in two distinct ways. First, the quantity and quality of resources that flow through constellations are more or less homogenous. The disparate distribution in the most basic resources obligates rural communities to stitch together what few resources they do have, often drawing on community members or local businesses outside of emergency management. Additionally, constellations are formed as a consequence of failures of trust and reciprocity across social and geographic boundaries (rural/urban) which are imbedded in bridging and linking social capitals. In this way, the formation of constellations of bonding social capital illustrates the reactive, dynamic, and relational aspects of different types of social capital (Portes 1998; Straub et al. 2020). Development of constellations of bonding social capital improve the quality and quantity of human and built capitals. Forging and investing in these closely knit, social relationships within and

between rural communities allows them to cultivate resilience in resourceful, collective, and innovative ways.

The second implication of community disenfranchisement adversely shapes vulnerability, risk, and resilience to hazard events. The isolation and abandonment experienced by rural communities in Oklahoma which precipitates constellations of bonding social capital also creates an insular effect. By choosing not to invest in linking or bridging social capitals, communities close themselves off to access to many forms of capital that rural communities do not possess. Obstinance and self-sufficiency limits the resilient capacities for rural communities and can lead to loss spirals in other, related forms of capital (Ritchie 2004). Withdrawing from social interactions with those outside of the local community furthers social isolation and insulation. A lack of diverse economic development, few robust external social networks, and an aging population resistant to change inhibits access to and adoption of new ideas, techniques, or strategies from outside rural community networks. Demographic shifts including a lack of educational and economic opportunities, outmigration of younger generations, immigration of retirees, and shifting perspectives on volunteerism threaten aspects of cultural, social, and human capitals. Compromising these community strengths jeopardizes the future of rural spaces. A lack of engagement with the political apparatus also depreciates the value of what little political capital rural communities do possess. Here, the development of an insular network of constellations of bonding social capital cultivates resilience while simultaneously enhancing vulnerability and risks to natural hazards.

The final implication related to community disenfranchisement relates to the individualization of risk. According to Beck (1992), technocratic risks are an inherent part of modernity and the incidence of disasters come to characterize society[9]. The consequences of disaster are factored into a rational calculus of "acceptable losses" to expediate economic growth (Beck 1992). In this way, institutions convert the uncertainty of hazards into a measurable quantity called risk. However, this assumes that risks are only economic and that communities have ample financial resources to mitigate those risks:

> The ways in which institutions are charged with attenuating risk is usually articulated through capitalist processes, which accept certain levels of risk in order to foster continued economic growth. However, some places do not have the luxury of deciding which risks to accept to maximize profitability and instead must assume those risks in the interest of survival (Clarke 1999:11).

Certain social institutions are obligated to remedy the adverse effects of modernization. However, since modernization is tied to economic development, institutional goals are often oriented specifically to repair disruptions to production (Beck 1997, 2008). Therefore, traditional recovery solutions for disasters are fundamentally aligned with economic interests, notably the preservation and restoration of wealth rather than addressing the negative psychological, social, and human effects of disaster (Kroll-Smith 2018). Moreover, according to this rationale, once vital economic processes are restored, recovery is largely deemed to be complete (Straub 2020).

Rural communities that do not have large economic centers are sometimes neglected by emergency management institutions. Institutional priorities, a reduction in

[9] While Beck would exclude natural disasters from consideration, many scholars criticize this position (i.e., Tierney 2014; Cutter 2020; Straub 2020).

social welfare programs, and forty years of neoliberal influence on economic policy have reshaped perceptions and expectations attached to social institutions traditionally responsible for disaster response and recovery (Tierney 2015). Rather than relying on institutions, popular discourse has gravitated toward individual accountability and self-sufficiency. In particular, preparedness and recovery are positioned as individual responsibilities rather than institutional obligations. Personal or individual insurance to cover property or financial loss is favored over the social insurance provided by institutions (Beck 2007). Systemically, this accomplishes two things. First, it reduces the expenditure of financial capital to assist individual losses from hazard events (this rationale does not apply to corporate losses). Second, it reduces the assumed accountability of social institutions for disaster outcomes. It stands to reason that community disenfranchisement (and its downstream effects) are products of this paradigm shift in social/individual accountability. Interestingly, community disenfranchisement (and other elements of cultural capital already discussed at length) also legitimates and rationalizes the individualization of risk. As isolated rural communities continue to value self-reliance and develop insular networks while simultaneously abandoning social institutions, individualizing risk is culturally, politically, and economically validated—setting a dangerous precedent for increasing hazard risk for the socially vulnerable.

6.2 Community best practices

Isolated examples of local programs and community initiatives might illustrate unconventional solutions to problems associated with vulnerability and risk. In Washita, a locally managed bank aware of common financial issues associated with agricultural

livelihoods reshaped its policy on loan and repayment terms to help local farmers and ranchers to navigate financial vulnerabilities exploited by drought, wildfire, hail, or severe storms. In Kiamichi, another program creates a partnership between local agriculture education programs and banking institutions. This partnership is designed to give students an opportunity to leverage school and banks to develop their own cattle business. Not only does this reduce the debt liability for individual students but it also provides inroads for future generations to stay in the area, grow the local economy, and increase the local tax base. This innovative partnership addresses three areas of opportunity for the region: financial, human, and social capital.

Finally, the HMP provides a community-oriented, place based, participatory mitigation plan for rural communities. Addressing local issues and future projects, the HMP fosters a culture of accountability and engagement around building and maintaining community and individual capacities of resilience through preparedness planning. These three best practices seem to be economical, culturally competent, and practical for most rural communities. Moreover, they enhance community strengths while addressing specific community weaknesses.

Tools such as the Harris Mitigation Plan provide a helpful guide to a systematic and community driven planning system. Incorporating the community in decision-making for developing transparent protocols, individualized planning guides, emergency management coordination, and future investment projects is informed by community participation which drives action. This departs from top-down, one-size-fits-all planning schemes rejected by Washita. Here, the community is responsible for planning. Positioning the public as accountable for decisions informed by emergency management

experts encourages community engagement, reinforcing the strengths of community capital as the source of resilience for rural communities. Taking the HMP as a blueprint for community-oriented planning articulates the designs of disaster scholars:

> For policy purposes, decreases in overall social vulnerability can be achieved locally by focusing mitigation and planning on the most important component for each community, rather than implementing broad-brush approaches that might miss the more intricate place-based differences in social vulnerability that are present at different localities (Cutter and Emrich 2006:111-112).

It also creates a community that is reflective of their needs. Periodic meetings to review disaster mitigation planning allow communities to be dynamic and responsive. Should something not work as designed, the community can discuss the circumstances of a particular situation, consider the ways in which that situation developed, and adapt their planning to accommodate unanticipated or misunderstood weaknesses in their plan. Building this type of flexibility into community-oriented disaster planning helps to overcome the unanticipated, incalculable, or invisible qualities of risk (Beck 1992, 1997; Ekberg 2007; Tierney 2014, 2020). The self-sufficiency inherent in the HMP aligns well with rural identity and ideals associated with rural stoicism. Developing pre-disaster mitigation and preparedness strategies should be tailored to community-specific contexts to encourage community involvement and engagement.

6.3 Rural community futures

Despite community actions which cultivate resilience—such as the Oklahoma Spirit, a culture of volunteerism, and constellations of bonding social capital—respondents are generally pessimistic about the future of their communities. Generally, many participants talked about a generational change in the value placed on service,

volunteerism, and dedication to community. Younger people are moving away to seek more lucrative educational and financial opportunities. Older emergency managers and volunteers would like to pass the torch and retire but are unable to due to these cultural, economic, and developmental factors.

More specifically, in Washita dismal crop and livestock prices make sustaining traditional farming and ranching livelihoods increasingly difficult. Respondents connect these lived realities to expanding global markets. It is clear to participants that these factors are driving away younger generations from farming or ranching professions. In Kiamichi, these and other factors are at work. Places like Atoka and Canton serve as cautionary tales about the outcomes for communities that sell their water to urban centers. However, with a lack of diverse economic sectors, communities are starting to view their highly coveted water sources as a necessary concession to make in the interest of survival. Paradoxically, many respondents still remain resolute if not optimistic about their communities. Religious faith and values of rural stoicism weigh strongly in these communities, providing reassurances and validation of their ways of life on the frontier.

As a scientist, I too have cause for concern about the longevity and sustainability for the communities and people in rural Oklahoma. Knowledge about discursive power, capitalistic processes, environmental degradation, and the divisive political climate coalesce and result in a professional pessimism about the future for these communities of simple, kind, and hearty people. However, countless hours spent with these folks—discussing their children, passion for their lifestyle, and selfless dedication to their communities—gives me pause. Toughness, persistence, and self-sufficiency are not merely attitudes or values. They are embodied. Physically, many of those I spoke with

were weathered, frayed, and diminished in some ways by age, the elements, and lifestyle. Yet their constitution remained hardened, steadfast, and righteous. Because of these qualities, and the strong, intimate social bonds that bind them together, I still believe them when they say:

> [we] never quit…no matter what situation, no matter what is thrown our way, no matter what has happened, we're still here. We're still here as a community…no matter how many deaths we have, how many storms we have…how much money we don't have, we're still here. That's resilience. We haven't left…we're in pretty bad shape right now and…this poor little old community in this part of the world can take a beating. And we ain't gonna go nowhere (DJPOLCL).

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APPENDICES

APPENDIX A: List of Acronyms

BRIC – Baseline Resilience Indicators for Communities
CART – Communities Advancing Resilience Toolkit
CCF – Community Capitals Framework
EPSCoR – Established Program to Stimulate Competitive Research
FEMA – Federal Emergency Management Administration
MCEER – Multidisciplinary Center for Earthquake Engineering Research
MSISNET – Meso-Scale Integrated Socio-Geographic Network
NASEM – National Academies of Sciences, Engineering, and Medicine
NIST – National Institute of Standards and Technology
NORC – National Opinion Research Center
NRC – National Research Council
NSF – National Science Foundation
ODC – Oklahoma Department of Commerce
ODEM – Oklahoma Department of Emergency Management
OPI – Oklahoma Policy Institute
SoVI – Social Vulnerability Index

APPENDIX B: Interview Guide (Department/Organization)

Department/Organization Interview Questions

* INTRODUCTION: Please introduce yourself by briefly summarizing your occupational duties/responsibilities as they related to responding to and/or preparing for extreme weather/environmental events.

1. To your knowledge, does your organization/department have a plan for responding to and/or preparing for extreme weather/environmental events such as severe storms, drought, and/or wildfires?

    a. (If yes) Please tell me about what you would consider to be the essential elements of that plan.

2. What has been your organization's/department's experience in dealing with drought?

3. Other than Droughts, what concerns, if any, do you have about the water supply in your area?

    a. Can you provide an example of what concerns you have? (Probe for news reports, experiences, etc.)

    b. Do you think water supplies will get better or worse in the future? Why?

4. Other than periods of drought, do you recall a time when the water levels in the lakes and streams were every low?

    a. In your opinion, what was the cause?

    b. What effect, if any, did the low levels of water have on you?

    c. Has the situation been resolved? How so?

    d. What would be the best way to deal with similar issues in the future?

5. Do you recall a time when water quality was threatened in your area?

    a. What happened?

    b. Do you think it is likely to happen again?

    c. Has the situation been remedied? If so, how?

6. What resources or knowledge would help to deal with future water quality issues?

7. What has been your organization's/department's experience in dealing with wildfires?

8. What has been your organization's/department's experience in dealing with severe weather events such as:

    a. Tornadoes

    b. Flooding

    c. Hail

    d. high winds

    e. winter storms

9. What about earthquakes?

    a. (If no) Do you anticipate incorporating earthquake related issues into your response/preparedness efforts in the future?

10. Overall, would you say the types of environmental events we've been discussing have become more frequent/severe over time?

11. Do you anticipate these types of events to become more frequent/severe in the future? Why or why not?

    a. (If yes) What specific measures have your organization/department taken to *prepare* for increased frequency/severity of these types of environmental events?

12. What other organizations/departments/communities/professionals have you *partnered* with in your response/preparedness efforts? (key players)

    a. What about [governmental *or* non-governmental] organizations?

    b. Who else might you consider partnering with in the future, if anyone?

13. What *resources* (such as types of data or other professionals) do you utilize when addressing, or planning to address, these types of events?

14. Do you feel that your organization/department has all of the resources it needs to address the types of issues we've discussed; and if not, what additional resources would you like?

    a. (if no) What additional resources would you like?

15. Are there any particular *barriers* you see affecting the ways in which you/your organization/department are able to respond to—and/or prepare for—these types of events?

16. In your opinion, what does your organization/department do best, or what are you most proud of, in terms of responding to and/or preparing for the types of events we've been discussing? (What is your niche?)

17. What does *resiliency* mean to you—both in the short- and long-term, if you think there is a difference?

    a. Is there a difference between short- and long-term resilience? How are they different?

* CONCLUSION:

- Is there anything you'd like to add pertaining the topics we've discussed?

- Do you have any recommendations for others you think we should speak with regarding our research?

NOTES:

APPENDIX C: Interview Guide (Landowner)

LANDOWNER QUESTIONS

* INTRODUCTION (to help tailor the interview): Please introduce yourself by briefly summarizing the use of your land and your responsibilities in managing it.

1. Do you have a plan for dealing with—or preparing for—the consequences of extreme weather/environmental events such as severe storms, drought, and/or wildfires?

    a. (If yes) Can you tell me about the aspects of that plan that you are most familiar with?

    b. What are the essential elements of this plan?

2. Have factors like drought affected you or your land? (If yes, please expand on how.)

3. Other than Droughts, what concerns, if any, do you have about the water supply in your area?

    a. Can you provide an example of what concerns you have? (Probe for news reports, experiences, etc.)

    b. Do you think water supplies will get better or worse in the future? Why?

4. Other than periods of drought, do you recall a time when the water levels in the lakes and streams were every low?

    a. In your opinion, what was the cause?

    b. What effect, if any, did the low levels of water have on you?

    c. Has the situation been resolved? How so?

    d. What would be the best way to deal with similar issues in the future?

5. Do you recall a time when water quality was threatened in your area?

    a. What happened?

    b. Do you think it is likely to happen again?

    c. Has the situation been remedied? If so, how?

6. What resources or knowledge would help to deal with future water quality issues?

7. Have wildfires affected you or your land? (If yes, please expand on how)

8. How about severe weather events such like: (ask about each event separately)

    a. Tornadoes

    b. Flooding

    c. Hail

    d. high winds

    e. winter storms

9. How about earthquakes? (If no, do you anticipate incorporating these elements in the future?)

10. Overall, would you say these types of environmental events have become more frequent/severe over time?

    a. Do you anticipate these types of events becoming more severe in the future? Why or why not?

11. What specific measures have you taken to prepare for the types of environmental events we've been discussing?

    a. What *future* measures might you consider?

12. Have you partnered with other landowners, organizations, or governmental departments in your response/preparedness efforts? (If yes, who?)

    a. Who might you consider partnering with in the future, if anyone?

13. What resources (such as types of data or other landowners) do you utilize when addressing (or planning to address) these types of events?

14. Do you feel like you have all the resources you need to address these types of issues?

    a. (If no) what additional resources would you like to see?

15. Are there any particular barriers you see affecting the ways you respond when these types of events occur?

16. In your opinion, what do you feel you do best in terms of preparedness and response to extreme environmental events?

17. What does *resiliency* mean to you, both in the long and short term?

    a. In your opinion, is there a difference between short- and long-term resiliency?

* CONCLUSION:

- Is there anything you'd like to add pertaining the topics we've discussed?

- Do you have any recommendations for others you think we should speak with regarding our research?

APPENDIX D: Institutional Review Board Approval

Oklahoma State University Institutional Review Board

Date:	Wednesday, April 4, 2018	**Protocol Expires: 8/13/2020**
IRB Application No:	AS1490	
Proposal Title:	Adapting Socio-ecological Systems to Increased Climate Variability	
Reviewed and Processed as:	Exempt **Modification**	

Status Recommended by Reviewer(s) **Approved**

Principal Investigator(s):

Duane A. Gill 431 Murray Stillwater, OK 74078	Ashley M Beaird 401 Murray Hall Stillwater, OK 74078	Benjamin J Gray 4124 N Washington St Stillwater, OK 74075
Rachel Gurney Stillwater, OK 74078	Austin Jobes 401 Murray Hall Stillwater, OK 74078	Kaitlin Schmidt Stillwater, OK 74078

The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office MUST be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

☐ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

Add Kaitlin Schmidt as a Co-PI

Signature :

Hugh Crethar, Chair, Institutional Review Board

Wednesday, April 4, 2018
Date

VITA

Adam Michael Straub

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