

**Resilience Planning in a Coastal Urban Environment: An Analysis of climate change planning
policy and procedure in Charleston, South Carolina**

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INTRODUCTION:

The coastal zones of the United States are home to many of the nation's largest cities and urban areas, and according to the National Oceanic and Atmospheric Administration (2010), 39 percent of Americans reside in counties bordering the United States coastline. The Census Bureau analysts predict the share of Americans living near the coastline to increase further; therefore, it is not unreasonable to assume nearly half of the United States population may reside in coastal urban areas in the coming decades. However, these statistics establish a problematic trend: the continued growth in raw population and population concentration in coastal areas will expose more Americans to the coastal-specific impacts of climate change. Sustained levels of sea-level rise and enhanced incidence and duration of storm systems will increase the frequency of coastal flooding and inundation and damage sensitive marine and estuarine ecosystem services. In combination, these impacts will render nearly half of the United States population more vulnerable during the 21st Century, lowering the capacity of coastal urban areas to maintain the integrity and vitality of their socio-economic systems.

Presented with this unavoidable issue, local and regional governments in coastal urban areas will need to embolden their planning efforts to prepare for, respond to, and recover from the stressors of climate change. Planning efforts will be fundamentally individual in nature, as local factors and conditions will determine many planning responses and objectives through a case-by-case methodology. Yet, planning efforts will likely be collaborative in nature as well, through which coastal cities and urban areas engage in a shared climate planning discourse, educating one another to develop collective resilience to the shared threats of climate change.

The emergence of resilience as a theme in planning theory and practice has increased in recent years (refer to listed references), and is viewed both as a strategy for response and as a system of thought. This thesis seeks to analyze climate planning strategies being promoted or taken in the Charleston, South Carolina region, and compare such measures for their alignment with or departure from resilience planning theory and practice as described by the social science community. The following questions will inform and

guide the research process of this thesis:

1. In the Charleston region, what climate change specific planning objectives have been prioritized or included in local (municipal) and regional (MPO; county) planning documents?
2. If adoption of climate change policy objectives has occurred, has implementation also occurred?
3. If implementation has occurred, what have been the results of implementation?
4. Could the planning measures being promoted or attempted in the Charleston region be classified as resilience enhancing?
5. Have local (municipal) and regional (MPO; county) planning entities engaged in discourses of shared learning/cooperation to build resilience?
6. Have climate policies been effective or not so effective in reaching desired outcomes?

BACKGROUND:

I have chosen to study the Charleston, South Carolina region because it is a coastal urban area familiar to me; I am a native of South Carolina and place significant value on the Charleston region. In this thesis, I identify the Charleston region as it is demographically defined by the United States Census Bureau at the Metropolitan Statistical Area (MSA) level. The Charleston – North Charleston, SC MSA comprises Berkeley, Charleston, and Dorchester Counties, which have a combined population of nearly 745,000 residents. The Charleston region offers a distinctive history and culture that has, in part, evolved from the area's proximity to the Atlantic Ocean. Though this proximity to water has cultivated a dynamic coastal urban area, this quality will inevitably bring misfortune (or opportunity) to the City and the region when sea levels rise and natural disasters worsen coastal destruction and flooding (National Climate Assessment Report 2014). Despite these threats, the Charleston region is not unfamiliar to natural hazards, as is evident in the hurricanes, tropical storms, and flooding events that have occurred in the past: Hurricane Hugo (1989), Hurricane Floyd (1999), flooding associated with Hurricane Joaquin (2015), and Hurricane Matthew (2016). Though the cyclical nature of Atlantic storm systems has continuously posed a threat to the Charleston region, such hazards have fostered a regional culture that is aware of, proactive towards, and responsive to the threats and outcomes of such hazards. Throughout its history, the region has consistently displayed a penchant for resilience to natural hazards like the hurricanes mentioned above. If the Charleston region already exhibits some measure of resilience, then I posit it should also have a predisposition to identify where and how it is most vulnerable to the stressors of climate change; doing so would enhance the capacity of the region (and localities) to manage the impacts of climate change while continuing to advance and thrive during the 21st Century.

In consideration of this regional culture of disaster awareness and resilience, my objective will be to analyze selected municipalities or jurisdictions in the Charleston - North Charleston, South Carolina Metropolitan Statistical Area (MSA) for the presence of planning efforts (either local/individually or regional/collaborative) that are in alignment with or departure from resilience planning theory and practice as described by the social science community. I plan to evaluate the local jurisdictions of Charleston, which

comprises the center of the region, North Charleston, located north of Charleston, and Mount Pleasant, located northeast of Charleston. I also plan to evaluate several regional jurisdictions within the MSA, including the Berkeley – Charleston – Dorchester Council of Governments (BCDCOG), the Metropolitan Planning Organization (MPO) for the Charleston region, and Charleston County. I have selected these municipalities and jurisdictions for their location within the larger MSA, but also because they all feature significant amounts of jurisdictional territory located on or near to the Atlantic Ocean or along major watercourses which lead to the Atlantic Ocean. This proximity to water unites each of these municipalities in their collective exposure to the coastal threats of climate change, particularly sea-level rise, coastal flooding, and hurricanes. These common stressors present an opportunity for each of these cities to individually plan and prepare for climate change, but also an opportunity for engagement in a regional dialogue to collectively plan for these and other impacts of climate change.

LITERATURE REVIEW:

As the catastrophic threats and harsh realities of climate change become more apparent, and the opportunities to successfully mitigate the worst impacts of this ongoing change continue to wane, many scientists and institutions have turned their collective attention towards the adaptive and resilience capacities of human systems (National Climate Assessment Report, 2014). Research on both adaptation and resilience has increased significantly in the past decade or so (Albers & Deppisch, 2013, p. 1599; Wamsler, Brink, & Rivera, 2013), mainly in response to the continued increase in atmospheric greenhouse gas (GHG) concentrations and the ineffective reactions of governance systems to mitigate GHG emissions and their sources on both global and national scales (National Climate Assessment Report, 2014). Also, research in these fields has increased to address the negative impacts climate change is already causing, and will cause for many of the most vulnerable human systems in our global society. I will begin my discussion with a brief theoretical examination of resilience, after which I will discuss resilience planning and politics in cities and urban areas. I will then discuss resilience cooperation among cities, providing an example from Southeast Asia. Finally, I will conclude my review with a critique of resilience thinking, as well as identify further challenges in resilience planning.

According to Walker, Holling, Carpenter, and Kinzig (2004), resilience is the ability to absorb and withstand disturbance and reorganize while undergoing change, to retain equivalent system structure, identity, and feedbacks as before. From this description, resilience can be regarded as a process of change and associated response(s) to specific or multiple stressors. Adaptation, per the *National Climate Assessment Report* (2014), “refers to action to prepare for and adjust to new conditions, thereby reducing harm or taking advantage of new opportunities.” (para. 1). This explanation of adaptation, when considered alongside resilience, shows the opportunity for each term to be used interchangeably, as both seek, in theory and practice, to prepare for the associated stressors of climate change. The ability to learn from change, to stimulate future or continued transformation and recovery to a new or alternate state of system equilibrium, is indicative of a resilient system (Lu & Stead, 2013). Regarding the use of the term “system” in statements above, I am referring to the notion of a social – ecological system (SES), a concept where human actors

play roles in the co-management of natural systems and resources, which originates from natural systems theory (Reed et al., 2013). Essentially, a social – ecological system is a dynamic relationship between the activities and decisions of human actors upon natural systems (e.g. improper floodplain land-use practices), which also exert pressure upon human actors through complex environmental conditions and responses (e.g. flooding and poor water quality resulting from impervious surfaces). Several scholars (Lu & Stead, 2013; Walker et al., 2004) do not consider certain aspects of social – ecological systems (e.g. economic sectors) as having constant, fixed states; rather, these aspects are cyclical in nature, transitioning through phases of growth and exploitation, conservation, collapse or release, and renewal and reorganization. Reed et al. (2013) make the point that, regarding climate change, resilience offers a shift from a predict-and-act mentality of system management, towards a mentality of system management that is flexible under conditions of environmental uncertainty. In the face of a complex and unpredictable problem like climate change, a resilient SES can self-organize and re-organize itself depending on its level of disturbance preparedness. The rate of recovery from one or multiple disturbances back to a former state, or into a new state of balance, is also an important dimension of the overall resilience of a SES (Lu & Stead, 2013). Even so, Albers and Deppisch (2013) lament the notion of a SES existing in a state of certain stability as problematic; instead, they argue a SES is much more resilient when adaptability is favored over stability.

To better operationalize resilience theory, which I have discussed in the previous section, scientists and researchers are attempting to construct resilience-building frameworks for use in cities and urban areas (Albers & Deppisch, 2013). These areas have become the center of resilience studies, as they and their inhabitants comprise intricate social – ecological systems representative of risk accumulation and disaster exposure (Wamsler et al., 2013). Cities and urban areas are often drivers of the consumption and the destruction of natural resources, and they are also disproportionately dependent on rural areas for their critical food and energy resources (Lovell & Taylor, 2013). This pronounced dependency on peripheral natural systems for continued urban prosperity and growth is frequently undermined by external environmental shocks, both predictable and unpredictable (Satterthwaite, 2013). The uncertainties of climate change are particularly significant to the future well-being of cities and urban areas and the

elaborate, often detached social – ecological systems they represent. To prepare and effectively respond to shocks and pressures of climate change, resilience researchers and urban planners have idealized the role of local governments, both regional and municipal, in building and expanding urban resilience (Lu & Stead, 2013). Traditionally, regional and urban planning disciplines have been instrumental in configuring the spatial development of social-urban systems, while simultaneously expanding the adaptive capacity of these systems to complex, yet location-specific environmental conditions and stressors (Albers & Deppisch, 2013; Lu & Stead, 2013). With climate change becoming a greater concern for the political and policy-making bodies of urban areas, appropriate spatial planning and land-use management are both viewed as meaningful solutions to enhance the long-term viability and resilience of urban areas (Albers & Deppisch, 2013; Lu & Stead, 2013). However, resilience in the context of spatial planning remains a new idea, and attempts are underway to operationalize, mobilize, and institutionalize resilience planning in the European cities and regions of Rostock (Germany), Rotterdam (the Netherlands), and Stockholm (Sweden) (Albers & Deppisch, 2013; Lu & Stead, 2013).

Albers and Deppisch (2013) have detailed a set of ten principles for urban and regional resilience planning that are specific to the spatial arrangement of the urban environment. These principles exemplify a much larger, ongoing trend that aims to operationalize, or kick-start resilience thinking in urban planning processes. The ten principles are: *Diversity* (p. 1601) to reduce vulnerability (e.g. economic diversity); *Redundancy*, (p. 1601) or functionally similar components to prevent system wide failure (e.g. similar commodity supply chains); *Efficiency* (p. 1601) in energy (e.g. diversity of energy sources and efficiency of built structures); *Flexibility and adaptability* (pp. 1601 - 1602) in buildings and land-use (e.g. multi-use structures and landscapes); *Autonomous operation* (p. 1602) independent of external factors (e.g. system remains functional during and after outside shocks); *Modularity* (p. 1602) of independently functioning system components (e.g. localized electrical generation); *Interdependency* (p. 1602) among system components to strengthen entire system (e.g. linkages between economic sectors); *Stabilizing and buffering factors* (p. 1602) that allow resistance and absorption of disturbances (e.g. buildings equipped with water cisterns); *Mobility* (p. 1602) of structures, particularly dwellings (e.g. mobile housing, or housing that may

be dismantled); *Planning foresight* (p. 1602) for future development that accounts for climate change and disturbance uncertainty (e.g. regulation of coastal structures for anticipated sea level rise) (Albers & Deppisch, 2013, pp. 1601 – 1602). Despite the role these principles may play in improving urban resilience, some may conflict with others, for example, diversity of economic sectors, but also interdependence among diverse economic sectors (Albers & Deppisch, 2013). However, it appears unclear at this point if conflicts between these principles could reduce overall urban resilience.

Tyler and Moench (2012) have also developed an urban resilience framework to guide planning practice towards resilience thinking. Their framework identifies three general components: systems, agents, and institutions (Tyler & Moench, 2012). Systems are defined as “underlying support systems that enable networks of provisioning and exchange for urban populations” (p. 313), agents are described as “actors in urban systems” (p. 314) that are present across multiple scales of complexity and order, from the individual actor to the organizational actor, and institutions are conceptualized as the manifestation of societal norms which “structure human behaviour and exchange in social and economic interactions” (p. 315) while serving to connect systems and agents to reduce vulnerability and risk (Tyler & Moench, 2012). Tyler and Moench (2012) further characterize each of these three components based on a review of resilience literature. The resilience of systems may be enhanced if system components display any of the following elements: *flexibility and diversity, redundancy, modularity, and safe failure* (Tyler & Moench, 2012, p. 313). The resilience of agents may be enhanced if they demonstrate: the capacity to be responsive[ness], the capacity to be resourceful[ness], and the capacity to learn (Tyler & Moench, 2012, p. 315). The resilience of institutions may be enhanced if the following features are present: *rights and entitlements linked to system access, decision-making processes, information flows, and application of new knowledge* (Tyler & Moench, 2012, p. 317).

In continuation of the development of urban resilience planning principles by Albers and Deppisch (2013) and a resilience planning framework by Tyler and Moench (2012), several scholars (Lu & Stead, 2013; Satterthwaite, 2013) have highlighted the critical role learning plays in spatial planning. When planners and political bodies learn from experience, whether negative (i.e. failure) or positive (i.e. success),

planning and preparation for long-term disturbances can be improved (Lu & Stead, 2013). To better plan and prepare for future disturbances, Wamsler et al. (2013) advocate for a comprehensive planning process, inclusive of risk assessment, hazard reduction, lessening of vulnerability, and improvement of preparedness. If this set of risk reduction measures is to be an effective part of the resilience planning processes, Wamsler et al. (2013) stress the need to acknowledge location-specific conditions of risk and vulnerability, especially microeconomic social and economic factors, that may directly and indirectly impact recovery at multiple scales. Satterthwaite (2013) further develops this dialogue of locality in resilience thinking, and the role of regional- and municipal-level political bodies in building and maintaining resilience to climate change. A government limited in size, scale, and scope is generally more accountable to its citizens, and is more likely to understand and respond to local conditions than a more intricate form of government (Satterthwaite, 2013). Ultimately, resilience to the shocks and stressors of climate change depend largely on locally organized, in-touch, and receptive governments equipped with the responsive and learning capacities represented citizens need to become, and remain resilient in the face of climate change and its associated disturbances (Satterthwaite, 2013).

Having established the fundamental roles both planning and political processes hold in urban resilience, I will now shift towards examining cooperation as a force for building resilience in cities. Satterthwaite (2013) details the presence of accumulated, or existing resilience in cities of many industrialized, or high income nations. This accumulated resilience is the result of local political responses to the needs of citizens, as well as responses to past disasters or disturbances (Satterthwaite, 2013). High-income nations and their cities are better equipped to respond to climate stressors and increase overall resilience than their counterparts in the developing world, as high-income states and cities are better able to mobilize resources, particularly monetary and technological resources, more quickly than many states and cities in the global south (Satterthwaite, 2013). Opposed to the accumulated resilience of cities within high-income nations, are the cities present in middle and low-income nations, which lack proper resilience infrastructure and safety nets, as well as the ability to mobilize resilience building resources quickly (Satterthwaite, 2013). But cities in all nations, whether rich or poor, will face the risks associated with

climate change. To quote Albers and Deppisch (2013): “Even if the challenges associated with climate change are not fundamentally new to spatial planning, they are thought to be ‘unprecedented in scale and scope.’” (p. 1599). Accumulated resilience from past disasters may buffer against future impacts of climate change in the cities of high-income nations, but this will not guarantee absolute, continued protection and recovery from the enhanced impacts of climate change. Likewise, in cities of middle to low-income nations, the presence of little or lack of accumulated resilience and little ability to leverage resilience capacity may prove detrimental to the long-term viability of these cities. This new, unaccustomed exposure to climate change poses a dilemma to all cities in search of solutions to enhance their preparedness, responses, and overall resilience to climate change disturbances.

Several scholars (Albers & Deppisch, 2013; Reed et al., 2013) have called for collaboration among cities, independent of geographic location and economic status, on advancing planning and political practices that are resilient; Indeed, initiatives like 100 Resilient Cities (100RC) (Rockefeller Foundation) and the C40 Cities Climate Leadership Group are only two examples of a larger network of global organizations acting to facilitate discourses which foster international cooperation to mitigate against, and prepare for climate change. Collaboration among cities creates a space for constructive learning, which may enhance capacities for resilience in individual cities or entire regions. Reed et al. (2013) provide an example of collaboration among cities and nations, specifically cities within a definitive geographic region, in their examination of “shared learning” in the Asian Cities Climate Change Resilience Network, or ACCCRN. This Southeast Asian network comprises 10 cities located in India, Indonesia, Thailand, and Vietnam (Reed et al., 2013). This collaborative, “shared learning” approach is facilitated on both national and local levels, creating, building, and sustaining resilience connections (Reed et al., 2013). Although cultural and social structures between these four nations and ten cities are diverse and complex, and the power dynamics unequal, stakeholders in ACCCRN have been successful in creating and enhancing a multilateral, open dialogue to debate, construct, and maintain resilience in the face of climate change (Reed et al., 2013).

There are also several critics of resilience thinking for cities, such as Cannon and Müller-Mahn (2010). In their analysis of resilience science, Cannon and Müller-Mahn (2010) argue resilience thinking

in its current form removes the influential power relations that surround, and create vulnerability. They believe resilience to climate change should be viewed as a socially constructed process, just as disasters are viewed as socially constructed events produced when socially mediated vulnerability is exacerbated by a natural hazard (Cannon & Müller-Mahn, 2010). Natural systems theory, along with its concept of the social – ecological system, render resilience thinking “inadequate and even false when it is being uncritically transferred to social phenomena, precisely because human systems embody power relations and do not involve analogies of being self-regulating or ‘rational’.” (Cannon & Müller-Mahn, 2010, p. 623). By disguising critical power relations among co-managers in a SES, imposing scientific and technical rationality onto an inherently social system, and ignoring the people most intimately connected to, and most vulnerable to change in an ecological system, resilience thinking as a purely scientific approach does not sufficiently lessen the vulnerability and improve the response and recovery of a social system to climate change (Cannon & Müller-Mahn, 2010). Incorporating “people-centered” discourse, inclusive of human livelihoods, community development needs and wants, and social vulnerabilities into the technical framework of resilience thinking is a recommendation Cannon and Müller-Mahn (2010) give to establish a more effective response to anticipated climate change.

As presented in this brief review, resilience thinking is becoming more mainstream in scientific and political dialogues, transcending international and institutional borders to effect better responses to the impacts of climate change. Resilience thinking, when applied to areas of spatial planning, risk assessment, and vulnerability reduction, may be viewed as a significant process to enhance the long-term viability of human systems, especially our cities and urban areas, which exemplify complex social-ecological systems. Despite the challenges present in the ongoing implementation and operationalization of resilience in the real world, this method of thinking has shown to be successful in building resilience among diverse stakeholders in cities and regions across the world, particularly in Southeast Asia and Western Europe (Albers & Deppisch, 2013; Lu & Stead, 2013). However, as humanity continues to grapple with a changing climate, additional development and application of resilience thinking will be needed to further enrich human systems into resilient human systems.

RESEARCH METHODOLOGY:

In seeking to answer the guiding questions I list in the introduction of this thesis, my methodology will consist of two main branches. The first branch will consist of thorough analyses of municipal-level planning documents (comprehensive or general plans, and others) put forth by the cities of Charleston, North Charleston, and Mount Pleasant. I will also analyze regional-level planning documents put forth by the Berkeley – Charleston – Dorchester Council of Governments (BCDCOG), the Metropolitan Planning Organization (MPO) for the Charleston region and by Charleston County, of which Charleston is the county seat. The second branch will involve physical interviews and/or discussions with planning officials working in the Charleston region to gain insight on how climate planning processes have occurred, to understand how those processes have been informed, and to understand the relative degree implementation of planning objectives has been carried out; additionally, if climate planning processes have not been undertaken in particular municipalities or jurisdictions, I seek to understand why such measures have not been prioritized. In the following two sections, I will break down each of these two branches further to provide greater methodological detail.

Plan Assessments:

I have identified eight local and regional planning documents I will evaluate to identify components or planning objectives that seek to enhance resilience. These documents are publicly available online, and I have downloaded a copy of each for review. Documents to be evaluated include:

1. Charleston, SC:
 - a. Century V Plan – Comprehensive Plan (2010)
 - b. Charleston Green Plan: A roadmap to sustainability (2009)
 - c. Sea Level Rise Strategy (2015)
2. North Charleston, SC:
 - a. Comprehensive Plan (2008); reviewed by city council in 2016

3. Mount Pleasant, SC:
 - a. Comprehensive Plan (2009); 2015 update adopted by city council
4. Berkeley – Charleston – Dorchester Council of Governments (BCDCOG):
 - a. Our Region Our Plan (2012)
5. Charleston County:
 - a. Comprehensive Plan (2008); reviewed by county council in 2015

In evaluating these seven plans, my objectives will be:

1. Identify planning efforts that are resilience-enhancing.
2. I will identify elements that place priority on the promotion of inter-municipal or inter-jurisdictional collaboration with respect to addressing or reducing vulnerability and risk to natural hazards and climate change. Collaboration among these governments would suggest the presence of shared learning, like the exchanges happening within the ACCCRN network in Southeast Asia (Reed et al., 2013).

Interviews:

I have selected seven planning officials working in the Charleston region, representative of various local and regional planning entities. I will interview each person to understand the role planning has taken in the promotion of disaster resilience and in preparing for the impacts of climate change. If circumstances allow,

I intend to interview planning officials from the following jurisdictions:

1. Charleston, SC – Department of Planning, Preservation & Sustainability
2. North Charleston, SC – Department of Planning and Zoning:
3. Mount Pleasant, SC – Department of Planning & Development
4. Berkeley – Charleston – Dorchester Council of Governments (BCDCOG):
5. Charleston County – Department of Zoning and Planning

All interviews will be for my own private use and reference and will not be released publicly. Interviewees will be allowed to participate at their own discretion, they may request anonymity, and their responses will be protected from public exposure.

In interviewing these planning officials, prospective questions include:

1. *In your professional opinion, is your city/jurisdiction prepared for the impacts associated with climate change? An example would be targeting the issue of sea level rise through planning efforts.*
2. *How has your city/jurisdiction attempted to address or prepare for the impacts associated with climate change in planning efforts? If such planning has been attempted, how has implementation occurred?*
3. *If planning for climate change has not occurred in a particular city/jurisdiction, I would like to understand why this is so. What are factors that have contributed to the lack of priority placed on preparing for the impacts of climate change, particularly preparation that could be stimulated and advanced through planning efforts.*
4. *The planning community has embraced adaptation and resilience as integral concepts for developing and organizing urban areas that are prepared for the impacts of climate change. As a planning professional, are you aware of these trends? [Offer definition of adaptation and resilience if necessary]*
5. *How is your city/jurisdiction already resilient to hazards and risks?*
6. *Given its coastal location and disaster history, the Charleston region is familiar to responding to frequent hazards and environmental risks. Would you consider this regional quality to be an effective starting point for preparing the region for climate change?*
7. *Relevant literature has highlighted the significance planning plays in promoting climate adaptation and resilience in urban areas. It is also suggested that shared learning or collaborative planning efforts are critical aspects of promoting local and regional climate resilience. Have municipalities at local levels and jurisdictions at regional levels in Charleston engaged in collaborative planning efforts to address climate change? If not climate change, what other issues have been the subject*

of inter-jurisdictional cooperation?

8. If such inter-jurisdictional (regional) collaboration does not exist for climate change, but does exist for other planning issues: *What do you consider are the issues preventing collaborative planning efforts that address climate change from occurring? Are these issues related to funding? Do these issues stem from larger issues of politics? Or has collaborative climate planning taken a backseat to higher priority planning objectives?*

FINDINGS:

In this section, I will present my research findings. First, I will present my evaluations of the seven planning documents, three plans released by the City of Charleston, and one plan each for the City of North Charleston, the Town of Mount Pleasant, the Berkeley – Charleston – Dorchester Council of Governments (BCDCOG), and Charleston County. Finally, I will present findings from the interviews I conducted with five planning officials in the Charleston region.

Plan Assessments:

During assessments of plans, I noticed a common theme: In comprehensive plans across the region, nine elements or chapters are included in each plan. These elements are: Population, housing, natural resources, cultural resources, economics, community facilities, transportation, land use, and priority investment. These elements are mandated by the State of South Carolina through the South Carolina Local Government Comprehensive Planning Enabling Act of 1994. This Act requires, among other planning principles, all municipalities within the state that have a zoning ordinance to produce a comprehensive plan containing the nine elements. Additionally, comprehensive plans must be updated once every ten years and reviewed at least once every five years. In assessing each element, jurisdictions must include an inventory of existing conditions; a statement of needs and goals; and strategies for implementation complete with time frames (State of South Carolina, 1994). In the assessments of comprehensive plans presented below, I focus on contents found within the natural resources element of each plan, as such chapters include discussion of coastal hazards, vulnerability, and disaster preparedness.

City of Charleston:

Century V Plan (2010); reviewed in 2016:

Charleston's comprehensive plan was released in 2010 and was last reviewed in December 2016. In the plan, there is no explicit mention of "climate change" throughout the entire document, nor is resilience discussed at any point. However, the most relevant element of the plan when analyzing for environmental goals and policy strategies is the Natural Resources chapter of the plan (City of Charleston, 2010, pp. 45-

52). In this chapter, the major goal set forth by Charleston is to “protect and preserve our natural resources to the greatest extent practical” (City of Charleston, 2010, p. 49); to realize this goal, eleven recommendations are put forth. Recommendations most pertinent to the protection of natural resources and preparation for coastal hazards include:

1. Ensure land development regulations adequately protect the City's farms, prime soils for farming, natural resources and rural areas.
2. Continue to support the use of an Urban Growth Boundary and Greenbelt and Parks system with Charleston County.
4. Continue to implement appropriate building standards for elevation, wind resistance and stormwater management and sustainability practices to plan and adapt to climatic events such as flooding and hurricanes.
5. Adopt storm water management practices and standards that are ‘light on the land’, encourage innovative BMP’s and ‘green’ methods, i.e., bio-swales, porous pavements, rain gardens, etc., for treating storm water and vegetative buffer requirements to improve the water quality of Charleston.
7. Continue to play an active role in promoting sustainability initiatives within municipal operations and the community at large, including: developing plans and education programs that promote sustainability and sustainable development; increase mobility choices; reduce water and air pollution; support energy conservation and efficiency; increase opportunities and funding for renewable energy; and encourage emission reductions and alternative fuels.

(City of Charleston, 2010, pp. 49-50)

Charleston frames its priorities for conserving and protecting natural resources and rural spaces within its boundaries, claiming the “sustainable management of natural resources” as being fundamental to sustaining quality of life for residents (City of Charleston, 2010, p. 47). In this chapter, the City prioritizes “surrounding the City with green”, primarily through land conservation and efforts aimed at “delineating the rural/suburban edge” through the use of an Urban Growth Boundary (UGB) (City of Charleston, 2010,

p. 47). Using the UGB, the City intends to limit the amount of new urban sprawl, conserving natural and rural areas; these areas may be utilized for agriculture and recreational uses, but Charleston also recognizes the valuable role these areas have in buffering against hazards and vulnerabilities, particularly coastal hazards. Given its coastal location, much of Charleston's land is at or a few feet above sea level, which, when considered with other factors like its subtropical climate, exposes many areas of the City to recurrent coastal hazards, particularly Atlantic hurricanes and tidal flooding events. Such geographic conditions necessitate strenuous "planning and adaptation" efforts for the built environment (City of Charleston, 2010, p. 48). Charleston aims to better prepare for possible climatic events through "local policy about urban design, historic preservation, land use, and disaster preparedness" (City of Charleston, 2010, p. 48). As an example, the City prioritizes strategies to strengthen building standards for elevation and wind resistance to lessen the vulnerability of new and renovated structures.

Charleston Green Plan: A roadmap to sustainability (2009):

This plan is a comprehensive framework released to respond to, and mitigate against the local impacts of climate change through the implementation of local sustainability measures. The plan, released in 2009, is the first of its kind in the State of South Carolina (Charleston Green Plan: A roadmap to sustainability, 2009, p. 2), and was assembled through participatory processes in which approximately 800 stakeholders, ranging from individual citizens, city staff, community organizations, and business groups (p. 3) worked together to foster a future for their city in which residents and the local economy may be better prepared to adapt to a changing climate by living and operating in a sustainable manner. In the plan, there are numerous references made towards "climate change" throughout the entire document, however, resilience is not discussed at any point. A major goal of the plan is to achieve a 30 percent reduction in GHG emissions by 2030 from 2002 levels, with an 83 percent reduction planned for 2050 (pp. 18-19). The plan sets forth four categories or sectors to target for emission reduction: Buildings (pp. 23-40), energy (pp. 41-58), transportation (pp. 85-108), and waste (pp. 109-132), as well as two sections involving aspects of community (pp. 59-84) and education (pp. 133-134); all elements are identified for prioritization in

cultivating sustainability and addressing the threats of climate change (Charleston Green Plan: A roadmap to sustainability, 2009). Buildings are identified as the leading source of emissions, at 58 percent (p. 16), and the plan recommends several policies to achieve reductions in the building stock. The implementation of a building weatherization program (p. 38) and the adoption of LEED building standards for all new or renovated municipal structures (pp. 31-32) are two examples of policy recommendations put forth. Regarding energy, the plan sets forth goals for the use of more use of renewable energies, setting a goal of 15% renewable energy by 2020 (p. 46). The City outlines the establishment of an ‘efficiency first’ policy, which would allow the City to reduce energy consumption while decreasing energy-related emissions (p. 49). Also, the plan recommends policy prescriptions for the promotion of both large scale renewable generation, as well as localized, on-site electrical generation (pp. 46-47). Transportation is the second largest contributor to GHG emissions in Charleston, at 40 percent (p. 16). In the plan, recommendations to reduce reliance on automobiles are promoted, such as the investment in a multi-modal transportation network (p. 92), the adoption of a complete streets ordinance (p. 93), and the adoption of a property tax assessment on vehicles based on emission rather than value (p. 106). Regarding waste, the plan sets goals to constrict the waste-to-landfill pipeline through the adoption of a zero-waste resolution (pp. 117-118), robust recycling and composting programs (pp. 122-123), and inter-jurisdictional cooperation to reduce levels of waste entering regional landfills (pp. 118-119). The aspects of community (pp. 59-84) and education (pp. 133-134) are also discussed in the plan. The promotion of sustainable communities, according to the City, is key to preparing citizens for climate change (p. 60). Recommendations to create these communities involve taking steps to reduce urban sprawl, the promotion of compact, mixed use developments, and the establishment of an urban growth boundary (UGB) (pp. 69-72). The promotion of both workforce and affordable housing (pp. 73-74) and localized food production (p. 74), are also included here. Finally, the green education of citizens, especially younger generations, is declared as playing a pivotal role in the success of both implementation and institutionalization of sustainability measures in the life of Charlestonians into the future (pp. 133-134).

Sea Level Rise Strategy (2015):

The City of Charleston, in releasing this plan, seeks to address the issue of sea level rise to enhance local resilience, outlining pathways to reach three broad goals: (1) “Put in place systems that prevent or reduce the impacts of SLR and significant rainfall”; (2) “Ensure public safety given flooding potential”; (3) “Ensure community and economic viability and recovery given flooding potential” (Sea Level Rise Strategy, 2015, p. 11). To realize these goals, Charleston has outlined a total of 76 initiatives (pp. 11-13), which are classified under three aspects of resilience (as identified by the City): Reinvest, respond, and ready (p. 5). In the plan, “climate change” is mentioned once, in connection with sea level rise projections. Resilience is referred to more than thirty times in the Sea Level Rise Strategy.

To reinvest, the City will prioritize “actions [that] will provide long-term improvements to public health, safety and quality of life through additional investment in infrastructure and physical modifications.” (p. 5). To respond, the City will promote “actions [that] will improve our response to, communication during, and management of flooding and related events to minimize service disruptions and to ensure public safety and quality of life.” (p. 5). To become ready, the City will enable and encourage prevention and preparedness through continued planning, monitoring and identification of changing vulnerabilities and risks.” (p. 5).

Reinvestment recommendations include the adoption and implementation of a drainage master plan, which would fund \$235 million dollars in drainage projects to handle tidal flooding (p. 6), participation in the National Flood Insurance Program (NFIP), which allows enforcement of “regulations and building codes that require flood resistant construction and requirements for storm-water quality and quantity control” (p. 6), and the use of green infrastructure where possible (p. 12). Response recommendations involve the enhancement and promotion of “real time flood incident information access” (p. 12) using multiple forms of media, as well as the improvement of emergency management operations. Readiness recommendations involve risk analyses of public assets, community engagement to raise awareness of the impacts of sea level rise, and inter-governmental collaboration to coordinate long-term planning efforts for sea level rise (p. 13).

City of North Charleston:

Comprehensive Plan (2008); amended by city council in 2015:

North Charleston’s comprehensive plan was released in 2008 and last amended in 2015. In the plan, “climate change” is mentioned once, in the Natural Resources chapter of the plan, when the issue of sea level rise is addressed; resilience is not discussed at any point in the document. North Charleston acknowledges local sea levels could rise one foot or more over a 50-year period if climate change predictions hold true or continue to accelerate. To monitor these predictions, the City has set a goal of analyzing changes in sea level trends locally over a ten-year period. If such trends occur at a rate that warrants action, the City would seek to amend (strengthen) buffer and setback regulations for floodplains and water bodies; the City would also analyze the possibility of “taking over land in areas that are likely to become subject to flooding.” (City of North Charleston, 2008, p. 5.7).

Like Charleston, the Natural Resources chapter of North Charleston’s plan is the most relevant element when analyzing for environmental goals and policy strategies. In this chapter, four goals are presented by the City:

1. Preserve natural systems associated with tidal streams, wetlands and floodplains.
2. Maintain and enhance the natural beauty throughout North Charleston.
3. Promote more ecological awareness.
4. Reduce stormwater runoff and non-point source pollution for improved water quality.

(City of North Charleston, 2008, pp. 5.18-5.19)

From these goals, the most relevant aims to “preserve natural systems associated with tidal streams, wetlands and floodplains” (p. 5.18), as this goal includes policy objectives which seek to maintain these areas of rural and natural land surrounding water bodies and water courses, which serve to buffer the built environment from coastal hazards and the possibility of sea level rise. One such policy strategy requires a 50-foot buffer between streams and wetlands and new property development, particularly development which creates new impervious surfaces.

Town of Mount Pleasant:

Comprehensive Plan (2009); amended by city council in 2014:

Mount Pleasant's comprehensive plan was released in 2009 and amended in 2014. In the plan, "climate change" is mentioned once, while resiliency is mentioned once, in reference to disaster preparedness. The reference to climate change is made to highlight the potential for impacts on local wildlife habitat, not coastal hazards like sea level rise. However, Mount Pleasant presents a substantial discussion of the vulnerabilities it faces with water, highlighting how the "elevation [of the town] gradually slopes up from six feet mean sea level near the [town's] marshes to between 25 and 30 feet mean sea level at several locations throughout the Town, mostly along the Highway 17 corridor [central areas of the town]." (Town of Mount Pleasant, 2009, p. 20). The Town includes these facts to illustrate the frequent issues it encounters with flooding, particularly during hurricanes, storm surges, tidal flooding, and heavy rainfall.

Like its neighbors, the Natural Resources chapter of Mount Pleasant's plan is the most relevant element when analyzing for environmental goals and policy strategies. In this chapter, seven goals are presented by the Town:

1. Protect environmentally sensitive lands and increase access to open space and rural landscapes.
2. Encourage the use of alternative transportation options to decrease congestion, promote health, and enhance quality of life.
3. Increase public access to and views of natural waterways.
4. Protect the water quality in Mount Pleasant's surrounding marshes and waterways to provide natural habitats, promote the local shrimping industry, and to maintain water suitable for various forms of recreation.
5. Ensure a long term sustainable supply of potable water by making efficient use of our existing water supply.
6. Promote green building practices to reduce the consumption and increase the reuse of raw materials, energy, water, and wastewater discharge.
7. Practice green Town operations and management to reduce the use of energy, water, and raw

materials and benefit from reduced operating costs.

(Town of Mount Pleasant, 2009, p. 19)

From these goals, the most relevant is protecting “environmentally sensitive lands and increase access to open space and rural landscapes” (p. 19), as this goal includes three policy objectives which seek to maintain areas of rural and natural land through growth management and conservation measures. One such policy seeks to “limit the development of environmentally sensitive lands, such as floodplains and wetlands” (p. 19). To prevent development in flood-prone areas, Mount Pleasant will “encourage developers to preserve vacant floodplain lands as open space and leave them in their natural state wherever possible.” (p. 19). In pursuing such a policy, the Town recognizes the value of such areas as buffers to flooding, serving as a form of protection for its residents from coastal hazards, particularly hurricanes. Additionally, Mount Pleasant aims to continue working “with state, county, and local partners to enhance emergency preparedness and maximize resiliency in response to all types of disasters, natural, and manmade.” (p. 18). To realize this goal, Mount Pleasant has a Hurricane Action Plan in place, in which the Town has a set of strategies and response measures in place to respond to hurricanes. Additionally, the Town views coordination with regional and state government agencies as a critical component of its emergency management and preparedness now and into the future.

Charleston County:

Comprehensive Plan (2008); amended by county council in 2015:

Charleston County’s comprehensive plan was released in 2008 and amended in 2015. In the plan, “climate change” is mentioned three times, in the Natural Resources chapter of the plan. The first mention of climate change is made in reference to the need to mitigate both high flood insurance premiums and “impacts of future hazards due to climate change.” (Comprehensive Plan, 2008, p. 74). The second climate change reference is made to highlight the need for more localized agriculture production considering

“climate change predictions” (p. 79). The third reference is made to the impacts future climate change may have on National Forests. There is no inclusion of the concept of resilience in this planning document.

The Natural Resources chapter of the County’s plan is the most relevant element when analyzing for environmental goals and policy strategies. In this chapter, Charleston County’s major goal is to preserve “unique Low Country natural resources, such as rivers, creeks, wetlands, aquatic and wildlife habitat, beaches and dunes, groundwater, forests, farmland soils, and air quality, and actions will be taken to mitigate any potential negative impacts of growth and development, and enhanced, where appropriate.” (p. 82). To realize this goal, a set of nineteen strategic actions are put forth, each informed by the following ‘needs’ for the protection of natural resources:

- Protecting and enhancing natural resources;
- Sustaining natural environments, habitats and wildlife;
- Promoting sustainable development practices;
- Promoting and protecting scenic corridors; and
- Allowing compact land use patterns to help minimize the fragmentation of natural resources.

(County of Charleston, 2008, p. 82)

Many of the nineteen strategic actions are aimed at enhancing sustainability within the County, including actions to manage growth, particularly using planning tools like an Urban Growth Boundary (UGB) and a Transfer of Development Rights (TDR) program. In using such tools, the County seeks to centralize and guide development into existing urbanized areas, lessening the consumption of rural and natural land. The County recognizes “sustainable development practices and patterns” (p. 73) as key to protecting natural resources. Charleston County views floodplains as one such natural resource, recognizing the critical ecosystem services these areas play, particularly in absorbing and retaining flood water. According to estimates in the plan, about “60 to 65 percent of the County is in a FEMA flood hazard area” and “the storm surge area encompasses most of the major rivers and adjoining estuarine marsh areas”, while most “of the remaining area that is not subject to storm surge is within the 100-year floodplain as designated

by FEMA.” (p. 74). Flooding is a perennial issue the County spends much time and resources addressing, as is evident in the Natural Resources chapter. The County identifies “hurricanes, tropical storms, and extra-tropical storms” as well as “intense severe thunderstorm activity” as the largest contributors to flooding locally (p. 74). Storm surge is also a flooding problem during storm events; during storm events, normal tidal flooding combines with storm surge to exacerbate flooding in many of the County’s lowest-lying areas. To address hazards and vulnerabilities, the County has a separate plan, called the Charleston Regional Hazard Mitigation Plan (2016), which is updated on a yearly basis. The plan analyzes vulnerability levels across the County for fifteen hazards, including hurricanes, flooding, earthquakes, and tsunamis. Using such vulnerability indices, appropriate response strategies for specific hazards and vulnerabilities are put forth.

Berkeley – Charleston – Dorchester Council of Governments (BCDCOG):

Our Region Our Plan (2012):

The Berkeley – Charleston – Dorchester Council of Governments (BCDCOG) released *Our Region Our Plan* in 2012 to serve as the Charleston region’s comprehensive plan. In the plan, “climate change” is mentioned once, in the Natural Environment chapter of the plan. The inclusion of climate change is made in reference to the benefits the region’s natural areas provide to protect against the impacts of future climate change. There is no robust discussion of the concept of resilience in this planning document; however, resilience is mentioned once, in reference to green infrastructure, which is recognized for its “ability to mitigate the impacts of development and industrial activity” while helping “the Low Country be more resilient in the face of hazards and other uncertainties, while also enhancing our quality of life and economic opportunities.” (*Our Region Our Plan*, 2012, p. 2-11).

The plan recognizes the significance of planning for natural resources at a regional level, “as the issues and opportunities are similarly unconstrained by political boundaries.” (p. 2-1). Prioritizing the preservation of natural resources and the ecosystem services they provide for residents is viewed as a method to lessen the region’s “vulnerability to coastal hazards.” (p. 2-7). Such hazards are identified as large-scale hazards

like hurricanes and tropical storms, which may occur seasonally, but the plan also identifies hazards that occur on a regular basis, particularly tidal flooding.

The BCDCOG links the region's rapid pace of urbanization and land development to reductions in the amount of open spaces, which diminishes the services such spaces provide for the region, particularly buffering and protecting people and property from coastal hazards like hurricanes and flooding.

In this chapter, the BCDCOG provides four broad goals aimed at the preservation of natural resources:

1. Protect water resources and quality.
2. Maintain adequate air quality.
3. Preserve our natural environment and foster a network of green infrastructure.
4. Protect rural and open space.

(BCDCOG, 2012, pp. 2-12-2-19)

These four goals are further dissected into specific objectives, policies, and strategies to support the realization of each goal. Goals three and four offer the most pertinent strategies to lessen regional vulnerability, as many utilize land use tools (UGB, compact development, buffer zoning) to safeguard natural landscapes, ensuring the ecosystem services such areas provide are not endangered through continued urban sprawl.

Interviews:

I interviewed five people working in the Charleston region: Four were planners, representative of various local and regional planning entities, and one person, a scientist, from a state agency specializing in coastal resource management research. In the subsequent passages, I present my findings in each case of personal communication made during December 2016 and January and February 2017.

Charleston, SC:

a. *Carolee Williams – Sustainability Project Manager within Charleston Department of Planning,*

Preservation & Sustainability

b. Katie McKain – Planner within Charleston Department of Planning, Preservation & Sustainability

I initially contacted Carolee Williams in December 2016, requesting an interview, either by telephone or in-person, to discuss her department's role in enhancing Mount Pleasant's preparedness for climate change. I received a timely response and an in-person interview was scheduled for, and held on the afternoon of January 9th, 2017. I present the most relevant findings from our roughly 35-minute interview below. Before the formal questions were addressed, I asked Carolee if she would like to talk about the status of both the Charleston Green Plan and the Sea Level Rise Strategy.

Regarding the Charleston Green Plan, Williams explained how the planning process occurred:

It was the most popular planning process I have ever been involved with. We had 80-120 people at every meeting, and we met once a month for two years. We had lots of public and private engagement. But, when it went to council, there were a few things in the plan that some of us would, if we had realized they were in there, we might have edited them out. Things like inspecting fireplaces or exploring the possibility of shared electricity bills. But those things were out there now, and they kind of brought the forces out. The day that it went to council, we thought we would be celebrating the success. But there were as many people at the council meeting for the plan as there were those against it. And I have never been a part of a planning process where we did not adopt it – we did not adopt the plan – we adopted it as an advisory report. (C. Williams, personal communication, January 9, 2017).

Williams mentioned the Green Plan as being very based in science, particularly climate science, and at levels of understanding she believes the public did not fully understand during that time seven years ago.

Regarding the Sea Level Rise Strategy, Williams explained how public acceptance of the document has been “fine”; she attributes much of the acceptance “to the fact that the document has so much emergency management and just plain old stormwater and floodplain management.” (C. Williams, personal

communication, January 9, 2017). Williams explained the 1.5 to 2.5 feet range of sea level rise included in the Strategy as being a “placeholder”, and will be used:

Until the Army Corps of Engineers updates their projections because our levels are based on 2008 IPCC projections, which are out of date. So, we are working on a new working plan going forward, so when those figures go up, we will change the range. But the fact that Charleston, South Carolina adopted a SLR range that we should be looking at, I’m still proud of that, no matter how old or low the projection may be. (C. Williams, personal communication, January 9, 2017).

Williams also explained why a 50-year timeframe for the Strategy was selected:

We didn’t plan too long-term, we said 50 years is longer than a mortgage, it’s longer than some buildings that are currently being designed are going to last. It’s not as long as we would hope, but we have taken the SLR study to other people, in the public, some of whom have said I can’t plan 50 years ahead, but 5 years, I could. But then, if we do a small timeframe, we would be planning for such a modest change, so 50 years seemed like a nice in-between. It meant that we didn’t have to talk about 3 – 6 feet of SLR, which can come later. We’re taking a ‘foot in the door’ approach. (C. Williams, personal communication, January 9, 2017).

When I asked her how resistance to the Green Plan impacted implementation of the plan or any of its objectives, Williams explained how implementation has not been tracked at all, saying:

I would love to do a list of what we have implemented over the past seven years. There may have been something about green business challenges in there that has happened. We have some stuff about closing off King Street for a market, which was pie-in-the-sky at the time, but the fact that once a month we close it off for a green market and 20,000 people come for that regularly – there was no concept that it would be so successful. Also, free, short-range transit opportunities were in the plan, and we now have it. Implementation wise, we have done a lot, but we don’t have a north star going forward. Opportunistically,

there are a lot of things we have been able to implement, although not on a strategic timeline.

(C. Williams, personal communication, January 9, 2017).

Additionally, I asked Williams if any of the City-led renewable energy requirements present in the Green Plan have been achieved or pursued, to which she responded “we are not monitoring it, it’s not happening. The City has not been a leader in producing energy with renewables.” (C. Williams, personal communication, January 9, 2017). Her colleague, Katie McKain, spoke up, explaining how “some zoning modifications to encourage solar” have been implemented, but “that the City doesn’t have the resources to track it right now.” (K. McKain, personal communication, January 9, 2017).

Following Ms. McKain’s response, Ms. Williams shifted back to the Sea Level Rise Strategy, explaining:

29 out of 76 total initiatives have been started in some fashion. One is the use of trees as a form of green infrastructure. Clearly, we have been banking everyone’s money within the city for about 30 years now to go towards the drainage improvements, those planned and under construction. The Market Street pumping station is nearly operational, which is in the location of an old creek bed; so, we have solved the issue in that area for now. I’m not saying we have solved the issue with tidal flooding on Market Street 20-years from now or even 100-years from now. But what we have done, we have added capacity for stormwater that didn’t exist before; it drains hundreds of feet below the street and is then pumped out into the harbor. But, until SLR impacts where that outflow goes, we’ve added capacity to handle stormwater where we didn’t before. In addition, we got funds in this year’s budget to hire a floodplain manager, so it is just not the big drainage projects, it’s also the staff additions we need to meet our goals. So, adding more staff in public services will be a huge win, not that adding one position will make a big change, but it helps. The list of initiatives is varied, for example, we applied for a grant to install detectors that have flashing signs for flooding, because at this point our public service people are being deployed for every flood, which has increased from two times in the 1970s to 36 times last year. Having signs

would make a big difference, because deploying staff lessens their capacity to respond to other issues too. You know, it's also stupid-simple policies like opening City-owned parking garages during floods so that nearby citizens can park *[for free]* their vehicles out of water to avoid damage. So, we have done some, but we haven't started as much since the Strategy was first released. But it's starting to gain traction.

(C. Williams, personal communication, January 9, 2017).

After both the Green Plan and the Sea Level Rise Strategy had been discussed, I introduced my list of prepared interview questions, which Williams had requested beforehand to better prepare herself given our 30-minute time constraint. When I asked if she believes Charleston is prepared for the impacts of climate change, she responded:

The climate change impacts we're most focused on are rain bombs and sea level rise. Heat and heat events – we haven't really done long-range projections. So, are we gonna talk a whole lot about climate change – no. Are we gonna talk about SLR – yes, and we are gonna get better prepared for that. I don't see much discussion about heat or rising temperatures happening right now, but there are some initiatives like getting A/C to low-income and senior residents. But a lot of that is driven by dollars and policy outside of planning.

(C. Williams, personal communication, January 9, 2017).

When I asked Williams how the City has attempted to prepare for climate change outside of the Green Plan and the Sea Level Rise Strategy, she said Charleston “is mostly focused on sea level rise, and sustainability and initiatives to promote sustainability around our City is generally how we are trying to plan and prepare for climate change.” (C. Williams, personal communication, January 9, 2017). When asked if there have been any factors that have contributed to a lack of climate change preparation, Williams claimed staffing issues have been a perennial problem, that “administrative stuff has kept us from doing more on climate change.” (C. Williams, personal communication, January 9, 2017). She also mentioned how “the negative response to the Green Plan hurt us”, and that “issues with plain denial – from citizens and officials” have been a hindrance to efforts in some cases (C. Williams, personal communication, January 9, 2017).

When I asked Williams about her knowledge of the concepts of adaptation and resilience, particularly their application in the planning community, Williams focused on her familiarity with adaptation, saying Charleston is “embracing adaptation”. (C. Williams, personal communication, January 9, 2017). She claimed Charleston is adapting in several ways, particularly by hardening and reinforcing existing infrastructure:

We have added a foot of barrier to the Battery, and we are looking at ways to do that on the remaining sections of it. Some forms of adaptation are gonna be simple, like we’ve been doing for generations, like building up your roads. Some *[roads]* are already on landfill, so we just build higher and they will hold back water.

(C. Williams, personal communication, January 9, 2017).

After making these statements, Williams offered a serious statement about Charleston and climate change, shifting into what I would describe as an emotional reflection:

Now what we are not dealing with is the long-term change. I don’t know if that is right or wrong, but *[pause]* when you look at the 6.5 feet projection of SLR, you go - why bother? But if you look at the 1.5 – 2.5 range, you can do some of the small things, and it means people are embracing it and the associated minor lifestyle changes. It’s emotional for me, it’s not a head-in-the-sand approach, it’s just small changes now, and getting people to understand through these changes. And when we get the icky, in-your-face impacts we’ll start dealing with them. We must buy more time. Both of us *[referring to herself and Katie]* own property that isn’t too far from the water; do I think I’m owed a buyout for something that is gonna happen in 30 years? I don’t think so, in a free market. Katie may feel different, like a lot of people. It’s emotional. (C. Williams, personal communication, January 9, 2017).

Her tone shifted again, back into its normal range, as she explained how Charleston plans to pursue buyouts if necessary:

If we see the need to start making hard choices, and to seek federal assistance for starting the buyouts, we will. But, when having to buy out, say, 40 flood prone properties a year becomes the norm, I don't see the longevity of it. I don't think the FEMA buyout program will be able to handle all the demand for buying out these properties around the nation. We have to decide what land is valuable and what can be let go, public land can be sacrificed here and can be flooded, but at some point, we have to say this private property can't be used. And that's the big issue, how to incentivize people to leave things they are so attached to financially and emotionally? (C. Williams, personal communication, January 9, 2017).

Regarding resilience, Williams' understanding of the concept is less clear, as she explains how the "new mayor believes in resilience but we don't have a funded position for that." (C. Williams, personal communication, January 9, 2017). She also brought up funding challenges:

The City has competed for the 100 Resilient Cities grant three times now, but have not received one yet. The mayor is trying to find a way to make more of those efforts, but what we will start with is flooding because that's what people get now: We call flooding the little 'r', and we'll eventually get to the big 'R'. Resilience is a positive attitude and view, but it's just, from my understanding, such a broad concept with so many meanings.

(C. Williams, personal communication, January 9, 2017).

When I asked Williams how Charleston is already resilient to hazards and risks, she brought up Hurricane Hugo, claiming how the disaster "made a big difference for us" and "an imprint on this community. There was so much damage, so we know the risk going forward is real. So, we mobilize for disasters now, we take them seriously, and our emergency management process is a big part of that." (C. Williams, personal communication, January 9, 2017). Given her response, I asked if she considers this history to be an effective starting point for preparing Charleston and the surrounding region for climate change, to which she responded:

Absolutely. Certainly, Sandy did that for the New York region. Fortunately, they got so much funds after Sandy, stuff we never saw after Hugo. I think Sandy hit hard

economically; Hugo didn't teach us anything economically really, but Sandy said if these people cannot get to work and do their jobs for x-amount of days because there is no transportation system, people mobilize. New York, with their planning efforts and funds, which are greater than ours, that's good for them. What's maddening is when PBS comes down and compares Charleston to New York, and expects us to have done as much to prepare for SLR. But says nothing about our stormwater drainage and doesn't recognize the fact that New York got all those federal dollars after Sandy to help with their efforts. It's unfair because we know sea level rise is an issue that needs our attention. We're trying. (C. Williams, personal communication, January 9, 2017).

My last two questions for Ms. Williams surrounded the topics of collaborative planning and shared learning between communities. First, I asked if any collaborative climate planning efforts have been made in the Charleston region, or if Charleston has engaged in dialogues with other jurisdictions, to which she responded:

We have the Charleston Resilience Network (CRN), which 12-15 people from jurisdictions throughout the region have worked on. This network happened for a few reasons; it's mostly a blend of scientists and regional civic leaders, and Charleston County's emergency management people, and private and public utilities are on it. We've [CRN] gotten some grants; a NOAA grant will help the City of Charleston model how the improvements we are making for the stormwater and flood drainage issues will handle the current flooding levels plus the 1.5 – 2.5 feet of SLR we have projected for the short-term. We think that will make a difference for the strategy going forward. We're trying to make the CRN even more regional, and enhancing the value of all these local efforts into something larger with a focus that will unite these smaller, local responses. We also have pots of money that will help us analyze case studies from around the country, which will help us figure out, as a regional entity, what responses should be made to address climate change. (C. Williams, personal communication, January 9, 2017).

In my last question to Ms. Williams, I asked her about issues preventing collaborative climate planning efforts in the region, to which she responded:

Issues for preventing collaborative planning: It is easier for bigger governments to participate in regional efforts, I think, like how I take part in the Charleston Resilience Network, sometimes the City knows I'm there and sometimes they don't. But smaller communities in the region may not have the same resources or the dedicated staff to send to such meetings or meaningfully participate, even if they see climate change as an issue they care about. So that's where the COG's [MPO] role comes in, and has been helpful, I think. Also, the City of North Charleston, being more inland, had largely been out of the conversation. But just recently they have said, 'We're seeing impacts, so we'll send someone to the table.' It's a blend of things that usually prevent collaborative planning from taking off on a regional level. (C. Williams, personal communication, January 9, 2017).

North Charleston, SC:

a. Gwen Moultrie – Director of North Charleston Department of Planning and Zoning

I initially contacted Gwen Moultrie in December 2016, requesting an interview, either by telephone or in-person, to discuss North Charleston's preparedness for climate change. After a two-week period of receiving no response, I decided to reach out via telephone; my call was not received, but I left a message directed to Ms. Moultrie. At this time, I have not received any form of response, email or telephone call, from the North Charleston Department of Planning and Zoning.

Mount Pleasant, SC:

a. Christiane Farrell – Director of Mount Pleasant Department of Planning & Development

I initially contacted Christiane Farrell in December 2016, requesting an interview, either by telephone or in-person, to discuss her department's role in enhancing Mount Pleasant's preparedness for climate change. After a two-week period of receiving no response, I decided to reach out via telephone; Ms. Farrell was unavailable, but a staff member promised to deliver my message to her when she returned to the office. One day later, on January 13th, 2017, I received the following email from Ms. Farrell:

Thank you for reaching out to the Town regarding information we can share specific to climate change and preparation for coastal disasters. I will offer that we will mostly be able to speak to the preparation for coastal disasters, more so than climate change. For this reason I have copied Deputy Director Lee Cave as well as Rob Rogerson who serves as the floodplain manager for the Town. They are both very informed and can share much information regarding our regulations.

With respect to climate change, this is still a new subject for the Town, though, through the Town Administrator, we are currently seeking input and information on this topic so that we can begin to study and address its importance to Mount Pleasant.

I am certain that Lee and Rob will be able to share a lot of information with you, but should you need anything else, please feel free to contact me.

From this message, I directly contacted the appropriate staff members, Lee Cave and Rob Rogerson. However, at this time, I have not received any form of response, email or telephone call, from these contacts passed along by Ms. Farrell.

Charleston County:

a. Planner at Charleston County Department of Zoning and Planning

I initially contacted the Charleston County Department of Zoning and Planning in early December 2016, requesting an interview, either by telephone or in-person, to discuss the department's role in enhancing the County's preparedness for climate change. I received a timely response and an in-person interview was scheduled for, and held on the morning of January 4th, 2017. The planner I interviewed requested anonymity, so they will simply be referred to as "planner". I present the most relevant findings from our roughly 40-minute interview below.

When I asked the planner if they believe the County is prepared for the impacts of climate change, they responded:

We are working on it, I would say. With the floods that happened early last year, in

October, and then with the hurricane we had this year [*references to flooding associated with Hurricane Joaquin (2015) and Hurricane Matthew (2016)*]. Both have really sort of brought climate change issues to the forefront of our officials' minds. We work a lot with the county planning commission, and they are open to adding a new element to the county's Comprehensive Plan when we do our next update, which we will start on later this year [2017], to address climate change issues. We do have a hazard mitigation program, that is run out of building services, that does a lot for us, it also reduces the insurance rates for our residents – we were one of the first counties in the state to go to the two-foot freeboard, from one-foot freeboard, according to FEMA regulations. So, I think we are pretty proactive; there is more we can do, and we are going in that direction, but we do a lot now. (Planner, personal communication, January 4, 2017).

In response, I ask the planner if I am correct in assuming recent disaster events have made the issue of climate change more visible in the sense that more attention is being placed on climate change through planning efforts. The planner responded:

Yes. Also, the King tides [*local term for tidal flooding*] that, when combined with the 2015 flooding, exacerbated flooding damage really got a lot of officials and residents talking about the need to act to prevent that magnitude of damage going forward. (Planner, personal communication, January 4, 2017).

When I asked the planner how the County has attempted to prepare for climate change through planning efforts, they responded:

Well, we have the Urban Growth Boundary (UGB), which, as you know, basically allows for higher densities in the suburban/urban area in agreement with the cities that are impacted by the boundary. Development occurs where the infrastructure is, and outside of the UGB, we have low density requirements. Outside the UGB, the highest density is one

unit per acre, so that keeps the densities down. We have buffer and setback requirements too, and I think those are two big things that help to centralize growth, which helps lessen exposure to environmental hazards. (Planner, personal communication, January 4, 2017).

When asked if there have been any factors that have contributed to a lack of climate change preparation, the planner explains how denial of the problem and competing planning issues have impeded climate planning from occurring:

I think it was like it is anywhere else, climate change is a bad word, people don't want to believe in it, whether its elected officials or the general public, they don't want... there is this denial factor that is hard to counter. Also, it is just a hard thing to tackle, you know, where do we start, funding is always an issue for planners, and now we have this new problem to focus on. Plus, we just came out of the recession, so we have been very focused on many other issues, particularly economic recovery and development, housing affordability, and lots of other things.

(Planner, personal communication, January 4, 2017).

When I asked the planner about their knowledge of the concepts of adaptation and resilience, particularly their application in the planning community, they responded:

I understand what they are, but I think the application of them is a very local issue. Because, as an example, not rebuilding in an area that might be flood-prone – well that area might be an historic community whose residents might not have anywhere else to go or cannot afford to move. So how to balance that issue [*displacement*] – I know that there is a lot of concern over the federal government changing the flood insurance program because that is going to impact a lot of folks in that position where frequent flooding impacts their homes and they might not have access to insurance and could be forced out after they lose their homes in a disaster. So, while I think the ideology of it is good, you need to really think about how incorporating those concepts into your planning view is going to impact local

communities. (Planner, personal communication, January 4, 2017).

When I asked the planner how the County is already resilient to hazards and risks, they responded:

So, we have an emergency preparedness department, or an emergency operations center.

Our department is responsible for manning the planning side of that center; we all worked from there for a week during Hurricane Matthew. So, they coordinate with other jurisdictions for evacuations, and the aftermath of storms, particularly cleanup. Right now, our county public works department is still working with FEMA to be refunded payments for cleanup, as public works coordinated with all jurisdictions within the County to collect debris using private contractors.

(Planner, personal communication, January 4, 2017).

In response, I asked if they consider the region's risk history to be an effective starting point for preparing Charleston and the surrounding region for climate change, to which they responded, "yes, this is a good starting point to prepare us for more of what is to come." (Planner, personal communication, January 4, 2017).

My last two questions for the planner surrounded the topics of collaborative planning and shared learning between communities. First, I asked if any collaborative climate planning efforts have been made in the Charleston region, or if the County has engaged in dialogues with other jurisdictions, to which they responded:

We have not coordinated with other counties or jurisdictions outside of our boundaries. I would think that would be the main function or responsibility of the MPO to bring everyone together. Their board is made up of 47 people from across the region, so that would be a function that they could best provide. However, on a regular basis, we do some coordination with planning directors from neighboring counties on issues, whom I know personally. We also have a statewide chapter of the American Planning Association called

SCAPA, which through members and in recent conferences, we have had a lot of discussions about resiliency, particularly from other communities that were hit harder by the October 2015 flooding than we were. (Planner, personal communication, January 4, 2017).

In my last question to the planner, I asked them about issues preventing collaborative climate planning efforts in the region, to which they responded:

It's about putting out the fires as they come. We have higher priority things to deal with right now; we have transportation issues, affordable housing issues. Those are all things that need a regional look. And it's also about funding, such collaboration takes a lot of time, money, and manpower. So, trying to keep up with these issues and make a dent in solving or addressing them – it is just hard. There is a lot going on in our region. This is our planning department for unincorporated parts of the County [*points to a headcount chart on the wall*], plus planning for five small towns without planning departments, so we have all that going on with a limited amount of people. And not everyone in this chart does planning; we have front room and administrative people, we have code enforcement people, so only a select amount of staff members are left to handle bread and butter planning work, like site plan review, coordinating zoning and planning commission reviews, processing other applications. So, everyone is very involved in everything, so things can get accomplished. This is our planning project list from 2016 [*points to a list on the wall*], we do a lot of area planning for small towns, grant writing, community plans for large-scale developments. Only about half of our projects for the year were completed, because we just don't have enough people to accomplish all the daily work we do. So, it's not that we don't think about climate change, or that our planners avoid working on it, we do see it as an issue requiring our attention – it's just a factor of there is a lot going on that we must attend to first.

(Planner, personal communication, January 4, 2017).

Berkeley – Charleston – Dorchester Council of Governments (BCDCOG):

a. Planner (Anonymous)

I initially contacted the Berkeley – Charleston – Dorchester Council of Governments in December 2016, requesting an interview, either by telephone or in-person, to discuss the MPO's role in enhancing the Charleston region's preparedness for climate change. I received a timely response from a planner that has experience working on climate change issues, and a telephone interview was scheduled for, and held on the morning of January 10th, 2017; the person requested anonymity, and will be referred to as "planner". During this interview, the forum became more of a one-way method as opposed to a standard two-way exchange; not all the prepared questions were completely addressed, as the planner spoke during much of the scheduled time (which was limited). Prior to the interview, I had sent the planner my list of questions. I present the most relevant findings from our roughly 10-minute telephone interview below.

When I asked the regional planner if they believe the Charleston region is prepared for the impacts of climate change, they responded:

Absolutely not. There has been some movement that has started to address climate change, well, at least the local impacts of it. Sea level rise is a big deal, and as you know, the City of Charleston has started analyzing that issue. But as far as the region, in the form of a unified body, there has been little done at this point in time to tackle the long-term changes anticipated in sea levels and disaster frequency. And as far as your question regarding what has already been done in the region to prepare us, my answer would be initial steps have been taken, but mostly on local levels. The region is already well-equipped to respond to disaster and hazard events, given its history with hurricanes and flooding events; we have a robust system of emergency management with coordination from the smallest levels of government all the way to the State and up to FEMA. The major step the COG has taken has been through the Charleston Resilience Network, of which we have played a role in to identify and engage stakeholders across the region. Not all jurisdictions in the region have

been involved in the CRN, or come to the table, but most have demonstrated an interest in the work. (Planner, personal communication, January 10, 2017).

When asked if there have been any factors that have contributed to a lack of climate change preparation, the regional planner explained:

The number one barrier would have to be flat denial of the problem, but also what comes along with that problem – the longer-term changes that are really going to impact the way people live and the way our region operates. There is the usual denial that climate change is even happening, but the harshest form denial comes from the people that acknowledge its validity, but fail to consider the predictions dire enough to plan for now. I think some of the planners in the region are very aware more of the issue and that more needs to be done, but there is this mindset that it is this far-off thing and that sort of justifies putting off confrontation. The second barrier is the fact that other planning issues require our attention now. This region is growing so fast, our organization is focused on managing that growth, making sure the transportation network is keeping up with the growth. Many localities are focused on fostering job growth, as well as tackling housing affordability. Economic development has always been a regional focus, as well as transportation, and planning for these elements takes time, which leaves little time for climate change. (Planner, personal communication, January 10, 2017).

After offering this response, the planner indicated their time limit was nearing, so I asked them one last question: The Charleston Resilience Network seems to me, to be the first indication of a regional push to get the ball rolling to plan, regionally, for the local impacts of climate change. What happens next? The planner responded:

Right, the CRN is the first regional push towards greater cooperation in addressing the climate issue. Like I mentioned, we are still bringing all the players to the table, and at this stage, no locality has declined to join these efforts – although there has been no across the

board participation, there has been no rejection yet. As a matter of fact, the regional chamber of commerce, an organization that tends to be more conservative, recently joined. I think going forward, the next steps will involve drafting a regional climate action plan, where programs, policies, and feasible projects would be identified. With such a plan, funding sources, like grants, could be targeted. I think this is how the region should begin addressing climate change, and the planning community plays probably one of the most critical objectives: gather and engage the stakeholders so a framework can be made, and then we go for the low-hanging fruit of what can we work on in the short-term, and then go for the long-term. (Planner, personal communication, January 10, 2017).

Ocean and Coastal Resource Management (OCRM) with the South Carolina Department of Health and Environmental Control (DHEC):

a. Daniel Burger – Director, Coastal Services Division

During correspondence with the planner at the BCDCOG, it was recommended I speak with Daniel Burger. I initially contacted him in January 2017, requesting an interview, either by telephone or in-person, to discuss his division’s role in enhancing the Charleston region’s preparedness for climate change. One day later, on January 4th, 2017, I received the following email from Mr. Burger:

Mr. McKenzie: Thanks for reaching out. To the extent that I am able to provide information, I'm happy to speak with you. Do you have specific questions I could consider? Also, if you have not already, I recommend that you reach out to the City of Charleston and review its Sea Level Rise Strategy.

In response, I sent a copy of the interview questions I had used in interviews with other officials. After a period of two weeks had passed, I decided to send another follow-up email to Mr. Burger. However, at this time, I have not received any form of response from Daniel Burger.

South Carolina Sea Grant Consortium:

a. Dr. Elizabeth Fly – Coastal Climate Extension Specialist

During correspondence with the planner at the BCDCOG, it was recommended I speak with Dr. Elizabeth Fly. I contacted her in January 2017, requesting an interview, either by telephone or in-person, to discuss her organization's role in enhancing the Charleston region's preparedness for climate change. After a four-week period of receiving no response, I decided to reach out again, via email. A few days later I received a response, and a telephone interview was scheduled for, and held on the afternoon of February 23rd, 2017. I present the most relevant findings from our roughly 30-minute telephone interview below. Before the formal questions were addressed, I asked Dr. Fly if she would like to talk about the Charleston Resilience Network, particularly how it began and her organization's role in the network, she responded:

The CRN formed out of an exercise put on by the Department of Homeland Security. So, within DHS there is the Office of Infrastructure Protection, which deals with terrorism issues, particularly how terrorism impacts critical infrastructure; they started advocating climate change be included as a threat to critical infrastructure, and in doing so, launched pilot projects to get communities thinking about those climate threats. So, one was launched in Charleston about two years ago, which brought together about 70 people from around the region. These people were owners or operators of critical infrastructure, as well as other relevant groups and organization. Attendants were tasked with thinking about climate change planning and adaptation, and identifying local barriers to such planning. Out of that project, it became apparent for the need for local-level initiatives to lead the way in planning for climate change adaptation. So, that's how the CRN formed, and some of us that participated in that exercise banded together, which included my organization, the S.C. Sea Grant Consortium, but also the state office of Ocean and Coastal Resource Management, the City and County of Charleston, and the BCDCOG. These were the big players present in the beginning. So, since that time, things have been moving very slowly, but for a reason. Apparently, there have been similar efforts in the past, but those failed for various reasons. So, we have been moving slowly so that we don't fall apart like similar efforts before us. Now the consortium, we are a state agency that receives state and federal

funding, and we promote the protection and management of the state's coastal resources through research, education, and outreach. We do a lot of partnership building and collaborative planning efforts in the region. Also, we do research on behalf of the CRN, which is primarily funded through grants. (E. Fly, personal communication, February 23, 2017).

In response, I asked Dr. Fly why earlier efforts to plan for climate change broke down; however, she could not offer me an answer, as she was not around during those times. When I asked Dr. Fly if she believes the Charleston region is prepared for the impacts of climate change, she responded:

I think the region is in a better position than it has been, but there is a lot more work that needs to be done. We are still in the very initial planning stages of preparation, and not so far along in the implementation stage. It seems like there has been this explosion over the past year or two with Charleston getting in on the game, getting in on the action for planning for this issue. And I think a lot of what happened is people are beginning to see the impacts more and more. And I think we have reached a tipping point, as this region has been exploding with population growth, and land development has been moving a lot faster than the local knowledge of climate science. Development, some say is running rampant, and is ahead of the government's ability to really plan for or adapt the regulations to handle it. For example, the stormwater regulations aren't keeping up with the changes in science. Plus, we have had these extreme weather events during the past two years that have shown flooding is an issue and it will continue to become a big issue with climate change. Now people want action. Many localities view stormwater infrastructure as a low-hanging fruit, as it can be directly related to local flooding. So, targeting stormwater is sort of a low-hanging fruit of local adaptation. People are asking 'how can we design or retrofit systems for the impacts we're already seeing, and then add in those future impacts?'. And that's why the City of Charleston is investing hundreds of millions in drainage projects. So, I do think we have reached that tipping point of people acknowledging climate change is an

issue that needs immediate attention. But that requires coming together as a region, and having a harder conversation that hasn't been had yet. But we are working on it. (E. Fly, personal communication, February 23, 2017).

In response, I asked how the CRN is doing with member recruitment and if any planning efforts are being made at this stage in the network's development. Dr. Fly responded:

We are still making a name for ourselves. Really, the big accomplishment thus far has been the event we hosted following the October 2015 flooding, called the 'After Action Report'. We had about 100 people attend, from across the state. We also have a couple of ongoing grant programs, one is aimed at developing parcel-level flood models, and another aimed at funding community-level engagement to brainstorm local adaptation strategies. We also have a project funded by Homeland Security to develop localized assessment and adaption tools to be used across our region. Those are all ongoing projects. Our next step will be to expand the CRN and bring in as many regional stakeholders as possible. We want it to be as big as possible so it won't fall apart, which at this point I don't think it will. In April of this year, we are hosting a 'Rendezvous for Resilience', which is essentially going to be a networking event where top-level people and organizations from around the region will be invited to come and learn about the CRN; we're hoping this can become a periodic series to continually engage stakeholders. (E. Fly, personal communication, February 23, 2017).

In response, I asked if either North Charleston or Mount Pleasant, two municipalities I was unable to interview, are participants in the CRN. Dr. Fly responded:

North Charleston has, we have had their emergency manager present in a few meetings. However, Mount Pleasant has not participated yet. But, to be honest, I don't know if they have been formally asked to at this point. It would be a matter of engaging them. (E. Fly, personal communication, February 23, 2017).

When I asked Dr. Fly how the Charleston region is already resilient to hazards and risks, she responded:

I think the clearest answer is all communities in the region participate in something called the community ratings system. This is a program out of the National Flood Insurance Program, and jurisdictions are awarded points based on actions taken to reduce flooding risk. Through participation, they accrue points, and then they are placed into classes, which translate to percent discounts on insurance premiums for property owners. And, so Charleston County, ranked as a class IV, is the highest-ranking class east of the Mississippi. Charleston is right there too. So, they have done a lot of things to mitigate flood risk within the county to gain those points. However, most of this is all based on current flooding. But this has been a way to start the conversation with communities about mitigating flood risk. So, the area is actively pursuing these flood mitigation and community hazard reductions. I think that's a strong example. (E. Fly, personal communication, February 23, 2017).

I then asked Dr. Fly if there have been attempts to relocate people or property from flood-prone areas, to which she responded, "there have been some actions taken, particularly in North Charleston, which has pursued some buyouts. But much of that is grant funded by FEMA, so there hasn't been a dedicated source of funding locally for that." (E. Fly, personal communication, February 23, 2017). In my last question for Dr. Fly, I asked her if there has been any pushback against the type of advocacy and work the Charleston Resilience is attempting, to which she responded:

The biggest issue going forward is development, as well as transportation. We and our infrastructure are vulnerable to climate change. But many people have associated the increased flooding on the explosive growth our region is experiencing, which can certainly be linked in some cases, but this misses the larger picture that we are facing a larger issue – climate change. So, I think that is certainly one of the barriers to dealing with local climate impacts, like sea level rise. (E. Fly, personal communication, February 23, 2017).

DISCUSSION:

In this section, I will examine my research results, offering my interpretations of those findings, and discussing the policy implications for climate planning in the Charleston region. To do so, I will revisit the six guiding questions I included in the introduction of this thesis:

1. In the Charleston region, what climate change specific planning objectives have been prioritized or included in local (municipal) and regional (MPO; county) planning documents?
2. If adoption of climate change policy objectives has occurred, has implementation also occurred?
3. If implementation has occurred, what have been the results of implementation?
4. Could the planning measures being promoted or attempted in the Charleston region be classified as resilience enhancing?
5. Have local (municipal) and regional (MPO; county) planning entities engaged in discourses of shared learning/cooperation to build resilience?
6. Have climate policies been effective or not so effective in reaching desired outcomes?

After revisiting these questions, I will offer a set of three recommendations which, if adopted, would do well to further build resilience, reduce vulnerability, and prepare the Charleston region for the future hazards and risks associated with climate change.

Question 1: In the Charleston region, what climate change specific planning objectives have been prioritized or included in local (municipal) and regional (MPO; county) planning documents?

In my research, only two planning documents, the Charleston Green Plan and the Sea Level Rise Strategy, may be classified as containing climate change specific objectives. Though the seven comprehensive plans analyzed contain rigorous discussion about natural resource protection and numerous policy objectives to preserve natural and open resource, such objectives are not prioritized because they will safeguard localities and the region from climate change. I would argue many of these policies are resilience-enhancing, as they

seek to lessen exposure to coastal hazards and risks, like hurricanes and flooding. However, these policies are indirectly linked to climate change – though they are not prioritized to prepare jurisdictions and the region for climate change, the realization of such policies would help prepare the region for the impacts of climate change.

As revealed in the previous section, the Green Plan and the Sea Level Rise Strategy stand as testaments to the City of Charleston’s determination to respond to the threat of climate change; the Green Plan is a bold vision containing many policy objectives, each designed at making Charleston a more sustainable city. The Sea Level Rise Strategy offers a more targeted strategy to tackle flooding and sea level rise, in which 76 initiatives are outlined to prepare the City for a 1.5 – 2.5 feet range of sea level rise – which is acknowledged as being a low range, but stands out as being the only such visible effort occurring in the Charleston region. Of course, my inability to speak with planning officials in both North Charleston and Mount Pleasant hindered my ability to fully understand climate planning efforts in those municipalities.

Question 2: If adoption of climate change policy objectives has occurred, has implementation also occurred?

As I learned from Carolee Williams, a planner with the City of Charleston, implementation of the Green Plan has not occurred; it was adopted but is not binding, and although a few objectives have been accomplished, the broad-based sustainability vision of the Green Plan has not been realized. The Sea Level Rise Strategy is the most recent and promising plan put forth in the Charleston region; it has been adopted and roughly 34 percent of the initiatives have been undertaken or implemented in some form, the most recent being the addition of a chief resilience officer in late January 2017 (Darlington, 2017). The Sea Level Rise Strategy stands as the only plan being implemented which specifically targets an impact of climate change. Additionally, Charleston County oversees the implementation of its Urban Growth Boundary (UGB), which, in accordance with municipalities within the County, like Charleston, seeks to curb urban sprawl and preserve the functionality of the natural landscape, particularly the benefits gained from ecosystem services.

When asked about implementation, three out of four people interviewed responded that implementation of policies targeting climate change have not occurred, or are occurring, but at a slow pace. Although such consensus among those interviewed may be limited by the small number of people I interviewed, it is apparent objectives targeting climate change have not been implemented because climate change is not being universally planned for at this point in the Charleston region.

Question 3: If implementation has occurred, what have been the results of implementation?

As mentioned under the previous question, implementation of planning policies aimed at addressing climate change has not occurred, with only one plan having been released and fully adopted – the Sea Level Rise Strategy. As mentioned, a little over a third of the initiatives outlined in the Strategy have been implemented in some form; however, it has been less than one year since adoption of the Strategy (April 2016). Therefore, not enough time has passed to be able to critically analyze the effectiveness or results of the initiatives executed. This was evident in my interview with the two City of Charleston planners – the implementation stage of the Strategy is in its early stages. At the County level, the planner I interviewed claimed the major policy aimed to preserve the natural heritage of Charleston County, and therefore the ecosystem services they provide, is the implementation of an Urban Growth Boundary. The use of this boundary restricts densities and service expansion in rural areas of the County; however, the planner I interviewed could not speak to the effectiveness of the Urban Growth Boundary at managing the growth of development or urban expansion.

At the regional level, the Charleston Resilience Network offers a fresh opportunity for jurisdictions in the Charleston region to come together and formally address climate change. However, as Dr. Elizabeth Fly mentioned during our interview, very little implementation has occurred yet. Given past failures, the Network is taking a gradual approach to build regional planning capacity; most of the Network's initial work has involved recruiting jurisdictions around the region to participate and applying for grant funding to begin research projects. The Charleston Resilience Network is advancing a regional look at climate planning, and I consider implementation of projects will begin in the near-term.

Question 4: Could the planning measures being promoted or attempted in the Charleston region be classified as resilience enhancing?

I would classify many of the planning measures being promoted in the seven plans I analyzed as enhancing resilience in the Charleston region. In those plans, many of the goals and policy strategies present in the natural resource chapters recognize the critical link between the management and preservation of natural resources and the management of vulnerability to hazards and risks. An example is present with flooding: All seven plans include discussion about the universal issue of flooding, both from normal tidal cycles and from major disasters and storm events. In seeking strategies to lessen exposure and vulnerability to the damages of flooding, all seven plans are enhancing the ability of communities and jurisdictions to adapt to and withstand environmental stressors – although the word resilience is not explicitly used, the concept is applied in each plan when communities seek to build and foster resilience to hazards and risks.

Question 5: Have local (municipal) and regional (MPO; county) planning entities engaged in discourses of shared learning/cooperation to build resilience?

In my research of plans and through the interviews held, it is apparent to me that shared learning and collaborative planning efforts in the Charleston region have been made and are present in two forms. The first is in the robust disaster and hazard planning that takes place in the region. In all seven plans, the history of disaster in the region was a common theme; all jurisdictions have been exposed to disaster, from hurricanes and storm surge, to intense heat waves and drought. Jurisdictions realize they share these universal threats as one region, and so they have organized and participate in coordinated disaster preparedness and management. Although each jurisdiction maintains an individual emergency management plan, they have all embraced the idea of regional emergency preparedness – I believe such coordinated actions work to build regional resilience.

The second instance of shared learning is present in the formation of the Charleston Resilience Network. Although this working group of private and public stakeholders remains new and has not implemented any

identifiable strategy, the fact that such an organization is gradually expanding its base of participants and scope for capacity building is a step forward for building resilience to climate change in the Charleston region.

Question 6: Have climate policies been effective or not so effective in reaching desired outcomes?

This last question is the most intimidating to answer. As I have stated, very little policy implementation has occurred across the Charleston region, with Charleston's Sea Level Rise Strategy being the exception. Even so, application cannot be analyzed critically given the short timeframe of implementation. I would not say policies have been ineffective, as most policies targeting climate change have not been implemented, as is the case with the Green Plan, or such policies have been executed but remain in their initial state of application, as is the case of the Sea Level Rise Strategy. The City of Charleston is the major jurisdiction in the region, and it has taken the lead on climate change planning, at least through its response to sea level rise. I think their response has been effective in starting a regional dialogue in which the impacts of climate change are being considered by other communities. The Charleston Resilience Network, although a new player in the region, offers an opportunity for communities and other interests to come together and form a capacity-building platform in which climate change impacts may be considered and policies to build resilience may be formed and shared with all members.

Recommendations:

1. Jurisdictions should formally recognize the issue of climate change:

This is likely the most difficult recommendation I can offer. While basic in its simplicity, it will likely be a tough stance to form in the politically conservative State of South Carolina. I offer this recommendation because it is a problem I encountered during my analyses of plans and during my interviews. The use of climate change in planning documents was not universal despite every person I interviewed recognizing the urgency of the issue. The planning community in Charleston should formally address climate change, doing so will legitimize the issue and the responses

necessary to effectively plan for climate change.

2. Jurisdictions should begin planning for the impacts of climate change:

In recognizing climate change, planning efforts may become more targeted in their approach to address certain impacts. Despite the political climate of South Carolina, there is no law or statute on the books to suppress climate planning efforts at the jurisdictional level. In fact, after a review of the South Carolina Local Government Comprehensive Planning Enabling Act of 1994, there is language that allows jurisdictions to expand the number of elements included in comprehensive plans. The State requires a minimum of nine required elements; this allows discretion to the jurisdiction to include other elements deemed necessary. However, if jurisdictions would like to take a less politically confrontational stance with the State, they could follow the City of Charleston's example and release a smaller, more concise plan outlining specific response strategies to climate change or local impacts of climate change.

3. All jurisdictions in the Charleston region should participate in the Charleston Resilience Network:

The discovery of the Charleston Resilience Network was a welcome bright spot during this process, as it offers the broadest platform to start a regional dialogue addressing climate change, particularly aimed at building and sustaining regional resilience. Many of the major players in the Charleston region are present in the Network, including the City of Charleston, Charleston County, and the BCDCOG. However, major players like the Town of Mount Pleasant and Berkeley and Dorchester Counties are absent, and most notably, none of the region's small towns are listed as active participants in the Network. I recognize their absence does not equate to their misrepresentation, but the Network acknowledging their presence and seeking their input will act to further legitimize the Network, working to strengthen it and entrench it into the regional planning network.

CONCLUSION:

Summary:

The purpose of this thesis was to understand the roles of shared learning and cooperation among local and regional levels of governance in building or enhancing resilience to disturbances of climate change. In seeking to understand the roles shared learning and cooperation have in resilience building, I analyzed planning strategies being promoted or taken in the Charleston, South Carolina region. Specifically, I examined seven planning documents put forth by local and regional jurisdictions and interviewed five planning professionals working at local and regional levels to gauge the degree to which shared learning and cooperation operate in building and enhancing this region's resilience.

Going forward:

Regional planning for climate change in the Charleston, South Carolina region has not yet occurred. However, the City of Charleston, through its Sea Level Rise Strategy, offers an example of how local planning efforts have begun. Though implementation has just commenced, such efforts demonstrate a serious step forward for the City and the entire region. Additionally, the Charleston Resilience Network, also in its infancy, represents the beginnings of a regional institution to collaboratively plan for the impacts of climate change, in which jurisdictions and private entities across the region can engage in a dialogue of shared learning and capacity building. And so, with the continued implementation of the Sea Level Rise Strategy and the growth and formation of the Charleston Resilience Network, the Charleston, South Carolina region may come together and work to enhance and strengthen its resilience into the 21st Century.

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