

AN ABSTRACT OF THE DISSERTATION OF

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Title: Communities, Collaboration, and Climate Change Adaptation: Case Studies from Coastal Maine and Oregon

Abstract approved: _____

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Twenty five years' worth of science indicates that the world can expect a number of climate change impacts. Increasingly, local municipalities, businesses and communities of people are becoming more concerned about what to do, yet they are looking for ways to best work together under these conditions. Communities must adapt to environmental change if they are going to survive and thrive in the future. In order to adapt communities are learning how to work together and collaborate around complex scientific issues. The research presented here explores the nature of community-based groups working to adapt to climate change and investigates the extent to which they are doing so collaboratively. It presents four case studies (two in Maine and two in Oregon) of local or regional community groups working to adapt to climate change. The inquiry is framed around four areas of interest developed through a review of climate adaptation and collaboration literature. The areas of evaluation include: Purpose and Participation, Roles and Leadership, Knowledge and Learning, and Climate Change. Analysis of findings in these four areas describes how local and regional community groups are working together, and to what extent they are doing so collaboratively. It also identifies key

points of analysis that are important considerations for future community groups working in the realm of climate change adaptation.

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Communities, Collaboration, and Climate Change Adaptation: Case Studies from Coastal
Maine and Oregon

by
Miriah Russo Kelly

A DISSERTATION

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Presented August 31, 2015
Commencement June, 2016

Doctor of Philosophy dissertation of Miriah Russo Kelly presented on August 31, 2015

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Miriah Russo Kelly, Author

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation for the countless individuals who contributed to this work over the years. I am honored to have Dr. Gregg Walker as the chair of my graduate committee. Over the years he has taught me how to be a pracademic and he has showed me how to pursue a meaningful interdisciplinary career. Also, sincere thanks to my other committee members, Dr. Bryan Tilt, Dr. Anita Morzillo, and Joseph Cone for their continued guidance and patience. Thanks to Dr. Courtland Smith for stepping in as my graduate representative in the final stages of this process. I would like to offer special thanks to Oregon Sea Grant for their support and for providing me the space to pursue this work that I believe is so important to our times. Also, many thanks to the communities who opened their doors to me so that I could pursue this research. I am also blessed to have the support of countless friends and family who have all done their part to mentor me, console me, offer their advice, and provide the array of resources it took to complete this work. I am forever grateful for my parents for being pillars of knowledge and support throughout my life. Lastly, I would not be here without the love and support of my amazing husband and daughter. Michael has been with me at every step along this journey and has not wavered in his dedication to helping me fulfill my dream. To my daughter, Stella, who has been the most amazing gift; I hope that you will follow your heart and pursue your dreams and goals no matter how lofty they may seem. I am excited to see what the next chapter holds for us!

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Chapter One - Introduction and Problem Identification

Growing Concern over Climate Change Impacts

Two years ago, a front page headline in USA Today read, “Study: Sea-level rise threatens 1,400 U.S. cities.” Citing research conducted by Benjamin Strauss, a scientist at Climate Central, a non-profit, non-advocacy research group based in Princeton, New Jersey, the article reported that “rise in sea levels threatens the viability of more than 1,400 cities and towns, including Miami, Virginia Beach and Jacksonville, unless there are deep cuts in heat-trapping greenhouse gas emissions.” (Koch, 2013) More recently, in a Union of Concerned Scientists report, *Encroaching Tides: How Sea Level Rise and Tidal Flooding Threaten U.S. East and Gulf Coast Communities over the Next 30 Years*, Erika Spanger-Siegfried and colleagues assert that “coastal communities, and the nation as a whole, need to start planning today to cope with sea level rise and unprecedented tidal flooding, and to take swift and decisive action to limit longer-term damage to our coasts” (Spanger-Siegfried, Fitzpatrick, & Dahl, 2014, p. 1).

Over the last twenty-five years scientific evidence has mounted indicating that global greenhouse gas emissions (GHGs) are driving unprecedented changes to the environment. The recently published International Panel on Climate Change (IPCC, 2012) Fifth Assessment Report (AR5) on the physical science basis of climate change substantiates and clarifies previous findings indicating that, due to anthropogenic causes, the global ecosystem is undergoing drastic environmental change. Climate change is and will continue to express itself as extremes in temperature and precipitation, and ocean expansion. Climate change is exacerbating risks the world already faces, including shortages in food and water, exposure to natural disasters, and desertification of arable

land. (IPCC, 2013) The world is pressed now more than ever to consider the implications of these scientific findings.

Reports from the National Oceanic Atmospheric Association (NOAA) and NASA indicate that 2014 was the hottest year on record (Cole & McCarthy, 2015). In the U.S. alone, over the last few years, floods devastated coastal communities, droughts crippled agricultural regions, and wildfires raged out of control. Many have seen firsthand, and have watched on television, people suffering from the impacts of these extreme events and unprecedented changes. America, like the rest of the world, is considering how to adapt to a changing environment (Moser, 2009; Moser, 2013).

Why climate change adaptation?

When the first Intergovernmental Panel on Climate Change (IPCC) report was published in 1990, there was little attention paid to adapting to climate change. As was also the case at the first Conference of the Parties (COP) in Berlin in 1995, climate scientists and policy makers focused on reducing greenhouse gas emissions (GHGs). Now, as COP 21 Paris approaches, climate change scientists, policy makers, and stakeholders are addressing adaptation issues as much as they are discussing matters related to mitigation. In the recently published 5th IPCC report as well as the current UN climate change negotiations, adaptation is at the forefront of climate policy, alongside mitigation (IPCC, 2013).

The IPCC defines climate change adaptation as “an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates

harm or exploits beneficial opportunities.” (IPCC, 2013) The Fifth Assessment Report states that given prior and current global greenhouse gas emissions the climate is already changing and will continue to change drastically in the coming years. Therefore, mitigating climate change is only one piece of the climate change puzzle. Even if humans completely stop emitting greenhouse gases today, the world will still feel the effects for years to come (IPCC, 2013; Leary et.al., 2008; Adger et.al., 2009)

Climatic changes are expected to affect different human and ecological communities in very different ways. Therefore, adapting to environmental changes is embedded in the specific location or region, culture and industry where those changes occur (Adger, et al, 2009; Ensor et al., 2014; Snover et.al., 2007). Many case studies of communities adapting to climate change exist, though most of them are sited in highly vulnerable regions, especially in the least developed and developing countries (International Institute for Environment and Development, 2009; Ensor et al., 2014; Schipper et al. 2014. Less discussion, though, has occurred about adaptation in vulnerable communities and regions in developed countries (Ford and Ford, 2011). Additionally, adaptation research has mostly focused on scientific and technical attributes of the issues and has been less focused on developing information that is valuable for decision-makers (Barnett, 2010).

The National Academy of Science explains in its publication *Adapting to the Impacts of Climate Change* (2010) that the United States must work harder to adapt to changing conditions. Although adapting to the impacts of climate change often requires resources including funding, time, and knowledge of how to adapt, these resources are often lacking, leaving local communities with limited capacity to make necessary and informed changes.

(Moser, 2007; Moser and Boykoff, 2013; Hansen, 2014) Additionally, in a review of adaptation efforts in the United States Hansen and colleagues (2012) discovered that although there is much work being done around the U.S., there is a lot more local communities can be doing to adapt. They also reported that several communities are engaged in adaptation planning but few have actually implemented adaptation plans (Hansen et al., 2012)

While climate scientists continue to apply climate models and policy makers continue to deliberate and negotiate about climate policy, climate impacts are felt locally, at the community level. Consequently local and regional governments and organizations are being asked to respond. The International Council on Local Environmental Initiatives (ICLEI) has addressed the importance and need for local government involvement in the climate change adaptation effort and has offered advice for local communities seeking to adapt. The Climate Impacts Group (CLI) in association with ICLEI (Snover et.al., 2007) emphasize a number of reasons why local governments need to address climate adaptation. First, ICLEI explains that planning for the future can help communities now. For example, a community that implements a water conservation effort to cope with the effects of regularly occurring drought also helps itself prepare for periods of drought exacerbated by climate change. Second, ICLEI believes that local planning initiatives align with local government goals of protecting the health, safety, and welfare of our communities. Third, local communities will experience the impacts of climate change to varying degrees and in different ways. Although higher level governments can provide funding and support for local communities, they are not equipped nor do they have the regulatory authority to anticipate changes and make plans in local communities. Fourth, being proactive is less

costly and more effective than being reactive. In the wake of hurricane Sandy we saw massive costs associated with cleanup of beach communities who did not have any coastal armoring, like sand dunes and concrete revetments. In other communities there was less damage where dunes had been built up, hardening the shoreline, and the costs of cleanup were significantly lower (Dean, 2012). Fifth, local strategic planning can help reduce future risk and lower vulnerability to impacts and hazards. By regulating growth in areas prone to flooding and vulnerable to sea level rise, local governments can lower the exposure of their communities to risk. Sixth, strategic planning can help maximize the possible benefits of climate change, for example, a longer growing season for certain crops in some areas. Lastly, by anticipating future changes local governments can make incremental plans that spread the cost out over time. Rather than having a low lying water treatment plant upgraded, efforts can be out into transitioning water treatment processes over time to a facility in a less vulnerable location. Local communities need to adapt, but have limited resources for doing so. They can increase their capacity, however, by working together to improve their adaptive responses to local climate impacts.

Why coastal communities?

Coastal communities are at great risk to climate change. These communities face the challenges of increased storm surges and flooding, coastline erosion, sea level rise, ocean acidification, and changes in biophysical conditions in a variety of ecosystems. (Aerts et al., 2012; National Research Council, 2012; EPA.gov) In light of the heightened vulnerability of coastal communities and increased attention on the possible impacts, coastal communities

are considering what can be done at the local level to manage for expected climatic changes (Burkett and Davidson, 2012).

Adding to the importance of coastal adaptation is the fact that coastal systems are culturally and environmentally valuable, and they tend to be population and economic hubs. (Aerts et al., 2012) In the United States, our coasts offer recreational enjoyment, access to seafood, production and transportation, and they are comprised of valuable wetland ecosystems (US Global Climate Change Program, 2012). Climate change poses a risk to important coastal systems and is expected to affect the natural and built environment along coastlines throughout the country.

Extreme storm events, such as super storm Sandy and hurricane Katrina have raised awareness in the U.S. about the impact these events can have on coastal communities. Although scientists cannot draw a direct causal connection between “climate change” and these events, analysts predict that climatic change will result in more intense and possibly more frequent storms (Knuston, 2010). In 2012 the Federal Emergency Management Agency (FEMA) tasked surveyors to reconsider and remap the expected flood areas located in coastal zones. This FEMA flood mapping effort has added to the complexity of response, calculated risk, and associated cost associated with living in the coastal zone.

According to the US Global Change Research Program (2009) the Northeast should expect to experience severe flooding due to sea level rise and heavy downpours of precipitation. Climate change may exacerbate the frequency and intensity of “storm surges resulting in flooding, erosion, property damage, and loss of wetlands.” (p. 109) On the other side of the country, the Pacific Northwest coastline is likely to experience sea level rise resulting in “increased erosion and loss of land” (p. 137). Beaches will lose sand as a result

of the compounding effects of sea level rise and changing wind patterns. There is also concern that landslides will occur as a result of heavy precipitation events which decrease the stability of bluffs and slopes. (US Global Change Research Program, 2009; Melillo et al., 2014)

Changes like those reported above pose the risk of causing significant social, environmental and economic loss resulting from damage to vital infrastructure, important ecosystems, and communities of people (Environmental Protection Agency, n.d.; Melillo et.al., 2014). Coastal communities face a number of complex impacts related to climate change. Their assessed vulnerability and overall social, economic, and environmental importance substantiate the need for further research.

Why study groups and collaboration?

The risks associated with climate change are well-founded and will pose challenges to coastal communities into the future. Responding to these risks involves problem-solving and decision-making about the management of shared environmental resources. Municipalities, non-profit organizations, governmental agencies, and local property owners, all have a stake in the management of such shared resources and are pressed to work together in making decisions about how to adapt. (Adger, Lorenzoni and O'Brien, 2009; Leary, et al., 2008; Moser and Boykoff, 2013)

Collaboration has long been established as a means to an improved end in environmental and natural resource decision making (Wondelleck and Yaffee, 2000; Koontz, et al., 2004; Mason, 2008; Poncelet, 2004; Margerum, 2011; Daniels and Walker, 2001) Dukes et al. (2011) explain that community based collaboratives offer “a unique

forum for addressing complex environmental problems” (p. 2) and they are often successful when traditional forms of resource management have failed. Climate change is highly complex and requires a new and innovative form of management and decision making in order to adapt (Adger et al., 2009). More meaningful participation among stakeholders and effective collaboration among groups seeking to adapt would improve management and decision-making in this context (Executive Office of the President , 2010; Fussel, 2007; Moser, 2013; Ford and Ford, 2013)

Collaborative efforts seek to bring together diverse stakeholders with a variety of interests, values, and knowledge, providing an arena for a richer discussion and consideration of the issues at hand (Gray, 1989; Dukes, et al., 2011; Wondolleck and Yaffee, 2001; Margerum, 2013; Innes and Booher, 2010). Climate change is expected to affect communities and individuals in unique and different ways and local communities throughout the United States are anticipating and planning for place specific climate change impacts. State, county and local governments are working with local stakeholders to make decisions about how to adapt to changing conditions (Hansen, 2012; Moser, 2013). These community based groups offer unique insight into how diverse stakeholders are working together in the process of addressing their local needs.

More and more communities are seeking to engage in productive climate change adaptation initiatives. However, there is a lack of understanding about how groups can work together effectively to achieve their climate adaptation goals. Climate adaptation research has focused primarily on processes, though recent authors have pointed out the importance of better understanding the social dynamics and group interaction that occurs in these contexts (Lemieux et.al., 2015; Moser and Boykoff, 2013; Comacho, 2011) . Work in

the realm of collaboration around natural resource decision-making and management emphasizes the human dimensions of environmental issues and adds that substantive and relational elements are also important factors to consider. Through this work, I am seeking to fulfill the need for more attention to the social dynamics of climate change adaptation. I will do so by exploring case studies of community-based groups found in coastal Maine and Oregon. I will also investigate the nature of collaboration in these groups and provide findings that discuss key considerations for community-based groups seeking to adapt to climate change in a collaborative way.

In Summary

Strong scientific consensus exists on the drivers and implications of climate change. Twenty five years' worth of science indicates that the world can expect a number of climate change impacts. The time to address these impacts is now. The U.S. is a developed nation and thus has the capacity to do more. Increasingly, local municipalities, businesses and communities of people are becoming more concerned about what to do, yet we need to know more about how to best work together under these conditions. Communities must adapt to environmental change if they are going to survive and thrive in the future. In order to adapt individuals within the community group must learn how to work together and collaborate around complex scientific issues.

In this dissertation I investigate the nature of community-based groups working to adapt to climate change and I am interested in better understanding the extent to which they are doing so collaboratively. To do so I present four case studies (two in Maine and two in Oregon) of local or regional community groups working to adapt to climate change. My investigation is framed around

four areas of interest developed through my review of climate adaptation and collaboration literature. The areas of evaluation include: Purpose and Participation, Roles and Leadership, Knowledge and Learning, and Climate Change. Using these four areas of interest as my guide I will describe how local community groups are working together, and to what extent they are doing so collaboratively, as they attempt to adapt to climate change. These findings will add to a young, but growing, body of case study research regarding how community groups in developed nations are working together to address climate change impacts in their communities.

Chapter 2 - Literature Review

This chapter provides the foundation for this research project; it addresses literature in two general areas pertinent to understanding community groups and the nature of their collaboration around climate change adaptation. Here I am interested in studying communities of place. Robinson and Green (2011) make a distinction between communities of place and communities of practice noting that communities of place are characterized by their common interests grounded in a particular territorial place.

The first section of this literature review addresses climate change. It distinguishes adaptation from mitigation, followed by a review of work related to local community approaches to climate change adaptation. The second section of this chapter considers participation and collaboration, especially as they relate to the natural resources and environmental decision-making and management arenas. The commentary reviews work on community-based collaboration, and identifies attributes of collaboration relevant to this study. The third section identifies research needs and discusses the value of pursuing research that investigates the nature of community based groups working on climate

change adaptation. It also explains how better understanding the collaborative nature of these groups contributes to the growing body of literature in this field of interest.

Part One – Climate Change

The scientific basis of climate change

Today there is overwhelming consensus among scientists that the climate is changing and that it will continue to change (Cook et.al., 2013) The recently published Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC, 2013) indicates that a number of changes can be expected. Authored by an extensive network of scientists from around the world, the report indicates that natural and anthropogenic processes are altering the earth's energy budget and are causing the climate to change. The impacts are shown in changes to temperature, the water cycle, air quality, the ocean, the cryosphere, and sea level. The Pew Center on Global Climate Change (2001) reports observed changes due to human and natural influences. It explains that atmospheric composition has changed significantly since the age of industrialization. The balance between incoming and outgoing radiation has been disturbed resulting in "radiative forcing". Global temperature averages have risen, and precipitation seems more variable (IPCC, 2013) .

Gautier and Fellous (2008) editors of the book, *Facing Climate Change Together*, state that "we know that CO₂ is increasing because of human activities, global temperature is increasing, Arctic temperature is increasing at a much faster rate, sea level is rising, Arctic sea ice and most of its glaciers are melting, and the ocean is getting more acidic" (pp. 1-2). To reach these conclusions, climate change science requires long term analysis of highly

systemized observations. The science of climate change is complex and scientists are doing their best to analyze the data and make predictions about what the future will hold, but in all reality, people around the world won't really know until they experience the impacts of these changes.

Climate change conflict in the U.S.

I would be remiss if I failed to recognize that climate change is still a somewhat controversial topic in local communities around the U.S., as this is important for understanding the context in which climate adaptation initiatives are taking place. Although consensus on the drivers of climate change exists within multiple scientific communities, many people still doubt that climate change is happening and many more don't believe that changes are anthropogenically driven. Leiserowitz et.al. (2015) find that 18% of Americans believe that global warming is not happening and 32% believe that it is but is due to natural changes in the environment. They also find that 74% of Americans "rarely" or "never" discuss climate change with their friends and family.

There are a number of reasons why climate change has become such a contentious issue. Hulme (2009) argues that climate change has gone from being a scientific phenomenon to a social dilemma that affects American "politics, economics, popular culture, commerce, and religion." (p. xxvi) Climate change adaptation is a social process that conjures up issues related to individual values and power. (Ford and Ford, Eds., 2011) It is no longer a scientific problem for scientists to evaluate, rather it has become a concept that has the potential to change the way we live by altering what we value and affecting our behaviors. Climate change has the potential to drastically impact American culture, livelihoods, and futures. For most people there is a lot at stake.

Conflict exists not only about the drivers of climate change but also the ways in which climate change should be addressed. Jager and Moll (2011) write that “different people have different perceptions of the risks that they are facing and that leads to conflicts related to the implementation of adaptation measures.” (p. 213) and they argue that accounting for these different perspectives improves the adaptation initiative. Local adaptation requires local data and consideration of local perspectives. People have different attitudes values and beliefs, and mental models that determine their behavior. Cone and Winters (2011) define mental models as “representations in the mind of real or imagined conditions or situations” and explain that it is basically our perception of reality, which essentially affects behavior. Differences in perspectives can lead to conflict over how to address an issue or solve a problem, especially within the local community (Jager and Moll, 2011). Additionally, Dow, Haywood, Kettle, and Lackstrom (2013) explain that public and political opinions affect the acceptability of different adaptation objectives. Political orientations influence and mold mental models, and are important for understanding conflicting opinions about adaptation measures (Dow et al., 2013).

Coastal climate change impacts in the U.S.

Scientists have conducted significant research to assess how a changing climate will affect coastal systems around the world (Environmental Protection Agency, n.d.; Aerts et al, 2012; Scavia et.al., 2002) In the U.S. work has ramped up over time, especially post Superstorm Sandy, to better understand the impact of climate change on coastal communities. Coastal impacts of climate change have been researched heavily, especially in the United States, because:

“the coast has long provided communities with a multitude of benefits including an abundance of natural resources that sustain economies, societies and ecosystems. Coasts provide natural harbors for commerce, trade and transportation; beaches and shorelines that attract residents and tourists; wetlands and estuaries that are critical for fisheries and water resources. Coastal ecosystems provide critical functions to cycle and move nutrients, store carbon, detoxify wastes, and purify air and water. These areas also mitigate floods and buffer against coastal storms that bring high winds and salt water inland and erode the shore. Coastal regions are critical to the development, transportation, and processing of oil and natural gas resources and more recently are being explored as a source of energy captured from wind and waves.” (Burkett and Davidson, 2012, p.xiv)

Given the value of coastal landscapes, the U.S. Global Change Research Program (2009) reports that regional climate impacts on coasts will be significant. Expected impacts include sea level rise, storm surge, changes in precipitation, hypoxic and anoxic ocean waters, warmer water temperatures, ocean acidification, and changing ocean currents. The Environmental Protection Agency also reports these expected impacts and adds that climate change will worsen the problems that many coastal cities and towns already face, including shoreline erosion, coastal flooding and water pollution (epa.gov).

Climate change adaptation

Given what is known about how climate change will impact human populations in the future, communities of all sizes around the world are working to make decisions and changes in anticipation of the effects. Especially in developed nations like the U.S., adaptation efforts have become more prevalent in the last several years (Romsdahl, 2006; Dow et.al., 2013; Frazier, Wood, and Yarnal, 2010; Susko et.al. 2012; Ford and Ford, eds., 2011, National Research Council, 2010; Dickinson and Burton, 2011; Moser and Boykoff, 2013).

The Intergovernmental Panel on Climate Change (IPCC) defines climate change adaptation as: “Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.” (IPCC, 2013) Smit and Wandel (2006) well-known community adaptation and vulnerability researchers set forth a broader definition of adaptation, as presented in the context of human dimensions as “a process, action or outcome in a system (household, community, group, sector, region, country) in order for the system to better cope with, manage or adjust to some changing condition, stress, hazard, risk or opportunity” (p. 282). They further explain that several definitions of adaptation exist, but the common theme is that of making an adjustment of some kind in anticipation of change.

Adaptation is presented and viewed in the literature as a desirable response to changing environmental conditions (Adger, Lorenzoni, and O’Brien, 2009) and should be treated as an ongoing process that integrates multiple stakeholders across the array of social economic and environmental sectors (National Research Council, 2010). Moser (2009) explains that adaptation is always occurring and is expected, but that adaptation to climate change is characterized by purposeful responses to scientific evidence of climate change impacts. There are a broad range of responses that can be characterized as climate change adaptation and there is no one single approach that works for everyone (Fussell, 2007).

Adaptation and Mitigation

When the first IPCC report was published in 1990, and the concept of adaptation was not considered. It wasn’t until the Third Assessment report, published in 2001, that

adaptation was addressed considerably (Pelling, 2011; Schipper and Burton, 2009). As interest in climate change grew, and as communities around the world began feeling the effects of climate change, as evidenced by the more comprehensive discussion of adaptation in the most recent IPCC report published in 2013, the concept of adaptation has gained salience in the international negotiation arena. Today, in 2015 adaptation is a key facet of the UNFCCC negotiation dialogue and continues to grow in importance as climate change impacts are felt around the world.

This research focuses on climate change adaptation rather than mitigation. It is important to differentiate between the two, to further clarify what is being assessed here and to understand the origins of the concept. First, climate change mitigation efforts address reducing or containing green house gas emissions (Leary, et al., 2008). Adaptation initiatives consider what to do given the inevitable changes expected to occur as a result of greenhouse gas emissions (Adger et al., 2009). Many developed nations have focused more on mitigation efforts in the United Nations Framework Convention on Climate Change (UNFCCC), though many recognize the importance of implementing both adaptive and mitigative strategies at the national level (Dickinson and Burton, 2011; Executive Office of the President, 2013)

Adger and colleagues (2009) authors of the oft cited book *Adapting to Climate Change* assert that adapting to climate change is the most pressing issue of our time. Scientific evidence shows that even if everyone in the entire world stopped emitting greenhouse gases today that the affects will be felt for years to come (Picketts et al., 2012; IPCC, 2013; Leary et.al., 2008; Adger et.al., 2009). Adaptation is “a necessary response to climate

change whether or not mitigation occurs” (Picketts et.al., 2012, p 82). For some time adaptation measures were overshadowed by mitigation initiatives, as some felt that adaptation is taking attention away from the need to mitigate climate change and stop emitting greenhouse gases to the extent we currently are (Fussel, 2007; Amaru and Chhetri, 2013). Adapting to climate change offers a different kind of action on climate change and is now seen as complementary to mitigation efforts (Moser and Boykoff, 2013)

Adapting at the local level

Over the last several years, scholars and practitioners alike have called for communities to start adapting to changing climatic conditions. The Climate Impacts Group in Association with ICLEI- Local Governments for Sustainability prepared a seminal step-by-step guidebook for local government adaptation action (Snover et al., 2007). The call to action in the introduction, written by Ron Sims of King County Washington states that “the time to delay, defer, or deny is over. We must act” (p 13). In 2010, Susi Moser emphasized the need to pursue societally relevant practical knowledge that will inform positive adaptation (Moser, 2010). At the same time The National Academies Press (2010) identified a need to coordinate adaptation across all scales of government so as to “leverage limited resources, avoid redundant or conflicting projects, mandates and guidelines; improve understanding of changing conditions; overcome behavior-based limitations to the capacity to adapt; and encourage learning as part of the policy-making process” (p156) However, Hansen et al. (2012) concluded in their research regarding the *State of Adaptation in the United States* that adaptation efforts are underway around the United States, but an urgent need to do more still exists. In their report Hansen and colleagues

(2012) found that local, regional, and state planning is happening, though the implementation of plans has been sluggish at best.

Adaptation needs to be addressed at all levels of government and social aggregation, though frequently local communities are those on the front lines of change (Adger et al., 2005; Schipper et al., Schipper and Burton, 2009; Pelling, 2011; Thome and Klein, 2013; Ensor et al., 2014; Ensor and Berger, 2009; Picketts et al., 2012) . Much of the pressure to adapt to climate change then falls on individual cities and towns, though doing so can be quite difficult to achieve given limited resources and capacity of local governments (Gremillion, 2011). In the United States local governments are tasked with making key decisions about public infrastructure, natural resources, public facilities, and public health and safety, though up until more recently, few have considered climate change in the development of plans and policies related to these important local resources (National Research Council, 2010).

In 2010 President Obama issued a *Progress Report of the Interagency Climate Change Adaptation Task Force* in which he calls for a national strategy that develops “communications and capacity building, coordination and collaboration across government and with partners, evaluation and learning, and other priority issues.” (p. 7) In 2013 president Obama then presented *The President’s Climate Action Plan* in which he emphasized the need to adapt at the local level and promises support to fulfill local adaptation needs.

Some necessary adaptation measures can be extremely costly. For example, the cities of Miami and New York are engaging in multi-billion dollar projects to armor the coastline and update underground systems. (Rosenzweig, 2011; Score, 2010) Smaller cities and rural

communities often cannot afford large scale infrastructure improvement projects. However, adaptation actions don't always require immense financial capital. Snover et.al. (2007) argue that some adaptation initiatives can be rolled into existing planning, management, and decision-making at the local scale at little to no cost through existing water, ecosystem, and coastal management systems. Examples include preserving ecological buffers, limiting harvest for sensitive fisheries, and increasing billing rates for water, etc.

Adaptation may involve infrastructure projects or policy implementation. Both require the integration of climate change planning into a variety of municipal sectors, including water management, public health, land use planning and disaster response systems. (Schipper and Burton, 2009; Thome and Klein, 2013; Ford and Ford, 2011). The nature of the risk determines who needs to be involved and to what extent. In the end, collaboration amongst a number of sectors, is required to fully address the risk posed to the broader community (Fussel, 2007).

Localized climate adaptation became a priority when vulnerable communities, especially those in developing countries, started facing pressures that forced them to prepare for changes (Pelling, 2011; Schipper and Burton, 2009; Ensor and Berger, 2009). Places like Bangladesh and small island nations are already experiencing the severe impacts of climate change, making adaptation at the local level essential to survival (Ayers and Forsyth, 2010). Developed nations, like the U.S. have started to adapt, especially in the wake of extreme storm events like Superstorm Sandy (Travis, 2015). Communities all

around the world have become more aware of climate change impacts and are looking for ways to adapt.

Scale is an important factor for adapting to climate change. Adaptation actions in local communities are embedded within larger systems of regulation (Amaru and Chhestri, 2013; Schipper and Burton, 2009; Schipper et al., 2014). Local adaptation is constrained by the existence, or lack thereof, state and federal regulatory frameworks, making the scale of adaptation an important consideration in determining if an action is appropriate, legal, and worthwhile. (Adger et al., 2005; Dickinson and Burton, 2011). If a local municipality wants to implement a plan they must be in compliance with county, state and federal government policies. These nested systems pose a challenge to local communities seeking to make scale-appropriate decisions (Singleton, 2010; Cash et al., 2006)

Localized adaptation can take on many forms. Small forms of adaptation can occur as a single action, like elevating one's home. Large forms of adaptation can appear as systematic change, like the development of statewide regulation that prevents vulnerable areas from being developed. Adaptation can occur in response to the work of one individual or it can appear as a social process of multiple people working together (Ford and Ford, 2011; Wolf, 2011) It can also be observed as a technical process (Climate Change Adaptation, 2008). Romsdahl (2011) explains that adaptation appears in many forms including construction, regulations and planning, individual and collective changes within the community.

Coastal communities are adapting to climate change impacts in a number of ways. According to an Environmental Protection Agency report (n.d.), U.S. coastal communities

are adapting to sea level rise, coastal erosion, more frequent and intense storms and warmer ocean temperatures.

- *Restoring natural storm surge buffers and incorporating climate change into coastal habitat restoration plans*
- *Building or repairing dikes, seawalls, and other structures that protect cities from erosion and storms*
- *Modifying building codes to enable structures to withstand higher water levels*
- *Expanding setbacks (the distance between a structure and the shoreline) and instituting other land-use arrangements, including rolling easements (PDF), to enable wetlands and beaches to migrate inland*
- *Upgrading and redesigning infrastructure such as bridges, roads, culverts and stormwater systems*
- *Evaluating drinking water supplies with respect to climate change*
- *Mapping coastal hazards and developing emergency response plans with regard to sea level rise*

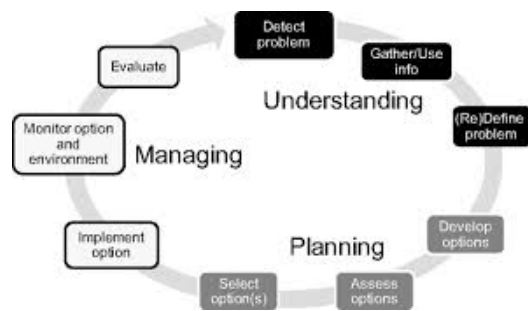
(Environmental Protection Agency, n.d.)

Taking these adaptive measures requires the works of a variety of individuals working together and making decisions about how to best manage the environment given expected changes.

Decision-Making

Local adaptation relies heavily on decision-making. Few, Brown, and Tompkins (2011) emphasize the importance of involving stakeholders in meaningful ways throughout the adaptation process. Moser and Ekstrom (2010) identify nine stages that occur in the process of making adaptation decisions. There are three realms of understanding, planning, and implementing climate change adaptation. They explain that barriers exist in every stage and that decision-making does not often follow a linear form. This diagram provides a heuristic from which adaptation decision-making processes can be evaluated and considered.

Figure 1 - Moser and Ekstrom (2010) Phases of Adaptation



Local adaptation often involves decision-making processes about complex issues. (Adger, Lorenzoni, O'Brien, 2009; Snover et.al., 2007; Moser and Ekstrom, 2010; Tribbia and Moser, 2008) Tribbia and Moser (2008) explain that decision-making around climate adaptation requires information and that meeting information needs is an important step in being able to adapt. More importantly, decision makers need information in a form that is useful and relevant to their needs. Therefore dialogue and interaction between assessors and users of information is key to decision-making (Jager and Moll, 2011). Romsdahl (2011) agrees that adaptation planning greatly benefits from effective decision support and explains that the linear form of information dissemination from scientists to stakeholders is not effective and that there is a need for an “integrated, or collaborative, feedback system where information and needs are shared between researchers.” (p. 511)

Furthermore, Tribbia and Moser (2008) suggest that “more information” and “better information” are insufficient and that there is a distinct need for boundary organizations to broker information between scientists and end users. “Boundary organizations can help improve the end-to-end process of knowledge co-production and application by enabling scientists and decision-makers to increase mutual understanding of capacities and needs while remaining within their respective professional boundaries”. (p. 317, derived from

Cash et.al.) Picketts et.al. (2012) assert that climate science needs to be presented to local communities in a simple form that is easily understood. Climate change science is complex and the impacts are uncertain. Therefore scientists need to be as clear, concise, and precise when communicating with local communities who intend to use their science to inform decision-making (Moser, 2009, Moser and Boykoff, 2013)

Assessing Vulnerability, Risk, and Adaptive Capacity

Communities are grounding adaptation decision-making by first assessing or better understanding perceived vulnerability and risk. Vulnerability is conceptualized as sensitivity and exposure (Smit and Wandel, 2006;) Adger et al. (2009) explain that vulnerability approaches can “directly address the physical risks of climate change through technological interventions”, “address the underlying and systemic factors that contribute to vulnerability in the first place”, and “focus on enhancing adaptive capacity”. (p. 7) Collier et.al. (2009) assert that the risks that climate change pose have the potential to exacerbate existing risks communities already face. Therefore the array of risks a community faces, not just those specifically related to climate change, should be considered (Smit and Wandel, 2006). Authors Aalts, Cannon, and Burton (2007) add that risks should be assessed at the community level and should involve the participation of local stakeholders.

Smit and Wandel (2006) note the practical application of risk assessment when it is considered in the context of existing decision structures like “risk management, land-use planning, livelihood enhancements, water and other resource management systems, development initiatives and so on.” (p.289) Aalst, Cannon, and Burton (2008) emphasize the need for participatory risk assessment processes and indicate that community

involvement in risk assessment is key to identifying the best ways to address perceived risks .

Smit and Wandel (2006) discuss the intimate relationships between vulnerability, adaptation, and adaptive capacity and explain that all of these concepts are important to consider in the context of climate change. Local adaptation efforts require a certain level of adaptive capacity in order to operate. Adaptive capacity is defined as “ the ability of a system to adjust to climate change, including climate variability and extremes, to potential damages, to take advantage of opportunities, or to cope with the consequences” (Shipper and Burton, 2009 p. 382) and can be built by “communicating climate change information, building awareness of potential impacts, maintaining well-being, protecting property or land, maintaining economic growth, or exploiting new opportunities” (Adger et.al., 2005, p. 79). Gupta et al. (2010) synthesized adaptive capacity research and found six primary dimensions of: variety, learning capacity, room for autonomous change, leadership, resources, and fair governance. The wheel is designed to help academics and practitioners assess ways to improve adaptive capacity.

Figure 2 - Gupta (2010) Adaptive Capacity Wheel



Adaptive capacity can be improved through collective action and the development of social capital (Adger, 2003). “Collective action requires networks and flows of information between individuals and groups to oil the wheels of decision-making. These networks are usefully described as an asset of an individual or a society and are increasingly termed social capital.” (p . 389) Adaptation initiatives rely on social capital in order to collectively address impacts (Adger, Lorenzoni and O’Brien, 2009). Moser (2010) points out, however, that most of the literature on adaptive capacity has focused on what it is, rather than how social capital can be developed and maintained to improve it. Yet, local adaptive capacity is an important consideration for improving the ability of local communities to adapt to climate change (Ensor et al., 2014).

More generally, authors including Chaskin, Brown, Venkatesh, and Vidal (2001) write about ways to build community capacity for addressing a variety of locally based issues. In doing so they emphasize the role of collaboration in improving community capacity. Collaborative approaches allow individuals within their respective communities to “gain

skills, knowledge, and connections” (p.34) which, in turn, improve their community’s ability to work together around any number of issues. The Aspen Institute Rural Economic Policy Program (n.d.) asserts that community capacity is improved through collaboration and they explain that collaboration is an indicator of community health. Given these assertions, collaboration is valued for improving adaptive capacity in addition to overall community capacity.

Community-Based Adaptation

Local communities have relied upon the community-based adaptation approach (CBA) to guide their climate adaptation efforts. The International Institute for Environment and Development (2009) define CBA as “a community led process, based on communities’ priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change”. (p.13) The International Institute for Environment and Development (2009) also explain that CBA work needs to include both scientific information in addition to local knowledge based on observed trends and prior experiences. Community-based adaptation has emerged in practice and in the literature as a valuable approach to local adaptation. Community-based adaptation has primarily been studied in developing nations given the high level of vulnerability and increased exposure of human populations in these areas (Schipper et al., 2014; Ensor and Berger, 2009; Ensor et al., 2014; The International Institute for Environment and Development, 2009). Places like Bangladesh, Sudan, Mozambique and other developing countries have less capacity to cope with a changing climate, whereas developed nations have more resources to devote to managing for climate change impacts. (The International Institute for Environment and

Development, 2009; Ford and Ford, 2011) In more recent years, however, developed countries have also started looking to this approach, to inform the development of more effective adaptation (Ford and Ford, 2011)

Community-based adaptation (CBA) research emerged because community leaders and local governments recognized the need to address the climate change impacts they were experiencing and they acknowledged the need to engage a broad array of stakeholders in the process. CBA is an approach that taps into local knowledge about how communities can adapt at the local level and it emphasizes participation of local citizens. (Ayers and Forsyth, 2009; Ensor, Berger, and Huq, 2014). Given the focus on local citizens, the CBA approach emphasizes the importance of local and traditional knowledge. Community based adaptation involves those who may not a high level of scientific or technical knowledge, but may have years of experience with the issue at hand. CBA research describes the importance of understanding existing local knowledge before discussing climate risks as defined by scientific and technical findings (Baas and Ramasamy, 2008; Ensor et al, 2014; The International Institute for Environment and Development, 2009). Effective community based adaptation requires the involvement of multiple stakeholders (Ensor et al, 2014; Schipper et al., 2014; Ayers and Forsyth, 2010; Picketts et al., 2012). Picketts et.al. (2012) synthesize research in this area and assert that there are many reasons why integrating community stakeholders is pivotal to adaptation:

- *Community members possess important local knowledge of the unique social, environmental, and economic conditions of the area;*
- *Engaging with local stakeholders promotes greater understanding and awareness of climate change and its impacts;*
- *Working with a community encourages future buy in and support for implementation;*

- *Adaptation success is best evaluated by those affected by and adapting to impacts; and*
- *The public is more likely to listen to local stakeholders than external experts. (p. 83)*

In the end, the community based adaptation approach underlines the importance and value of local stakeholders and it adds to understanding about local adaptation efforts. Local communities are at the front lines of change and are working to adapt to changing environmental conditions. Doing so requires decision-making, resources, and stakeholder involvement. The second section of this literature review will now explore stakeholder participation and collaboration, given the emphasis on these areas noted in the climate adaptation literature.

Part Two – Participation and Collaboration

The literature on participation and collaboration provides an essential building block of the dissertation research. The method and analysis draw on collaboration theory, research, and practice. The literature on participation in environmental decision-making provides a foundation for understanding present day emphasis on more collaborative approaches.

Participation

The literature on public participation and environmental decision making is rich (e.g., Cox, 2010; Dietz et.al., 2008; Depoe, Delicath, and Elsnebeer, 2004; Cahn and Passett, 1971, Weber, 2003). Cox (2010) defines public participation as “the ability of individual

citizens and groups to influence environmental decisions through 1) access to relevant information, 2) public comments to the agency responsible for a decision and 3) the right, through the courts, to hold public agencies and businesses accountable for their environmental decisions and behaviors” (p. 84) Depoe et al. (2004) define public participation as “pre-decisional communication between an agency or organization responsible for a decision and that organization’s relevant public community” (p. 115). Both of these definitions presented by key authors in this area of research focus on the inclusion of appropriate stakeholders in the process of making decisions that have the potential to affect them. They also assert that citizens have the right, ability, and legal authority to engage in a process that has the potential to shape their futures, or impact their lives in some way.

To this end, Depoe and colleagues , (2004) emphasize the importance of meaningful public participation, noting that the need for public participation extends well beyond what is required by law (e.g., in the National Environmental Policy Act). The one way, information dissemination model of public participation, often used by government agencies is insufficient, as it lacks attention to the valuable ideas and opinions the public holds. Instead a two-way model of public participation that fosters dialogue and a meaningful exchange of information is required to truly honor the value stakeholder participants have in natural resource decision-making (Depoe et al., 2004; Cox, 2010).

When done properly, public engagement can result in a more comprehensive understanding of an issue, broaden the options that can be considered for addressing the issue, and improve the acceptability of policy decisions (Dietz and Stern, 2008). However, it

often falls short because it occurs too late in the process, fosters a more adversarial approach, doesn't provide the space for meaningful dialogue, and lacks mechanisms for ensuring public values are accounted for (Depoe et al., 2004). As conventional public participation processes have revealed limitations, agencies, communities, and stakeholders have turned to more collaborative approaches.

Collaboration

Collaboration is carefully differentiated in the literature from participation and co-operation. Koontz et al. (2004) explain that "traditional participation has connoted involvement in scoping issues, commenting on plans, or attending public meetings" whereas "collaboration strives for more integrated involvement of diverse groups of stakeholders in the initiation, creation, implementation, and evaluation of alternatives that they have identified." 9p. 20) Margerum (2011) reports the differences between cooperation and collaboration and explains that cooperation occurs when parties are working independently toward a common goal. This is different from collaboration where participants are working together to achieve a common goal.

One of the first scholars to address collaboration theoretically and conceptually is Barbara Gray of Penn State University. Writing in her seminal book, *Collaborating* (1989), Gray (1989) defines collaboration as "a process of joint decision making among key stakeholders of a problem domain about the future of that domain" (p. 227). Wondolleck and Yaffee (2000) expand this definition of collaboration, adding that collaborative relationships must cross organizational or jurisdictional boundaries. Margerum's (2011) definition reflects the importance of collaborative organizations in "translating consensus into results" (p. 6)

Poncelet (2004) presents a synthesis of the value of collaboration in environmental problem-solving and decision-making contexts. Collaboration has been praised for its ability to “produce solutions to environmental problems that are more fair, well informed, and likely to be implemented and sustained and that are generally more acceptable to and beneficial for all parties concerned.” They are “well suited to the uncertainty and complexity that characterize contemporary environmental problems,” and they “result in better communication; better understanding of the issues, interests, and other stakeholders involved; stronger relationships; and deeper levels of trust and commitment” that “enhances the capacity of parties to deal with problems in the future.” (p. 4)

Collaboration is often regarded as an effective way to meaningfully engage stakeholders in decision-making and problem-solving around complex environmental issues.

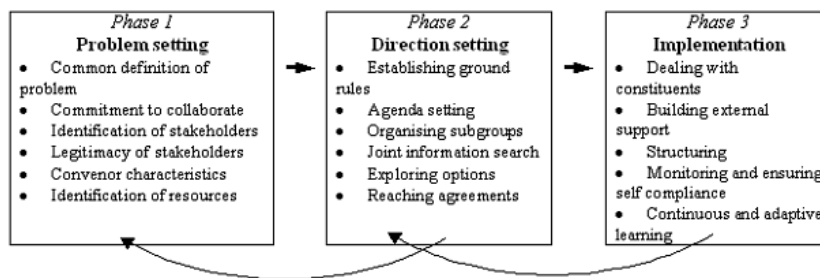
Cox (2010) suggests that effective collaboration has five conditions: 1) that all relevant stakeholders are at the table 2) that the participants adopt a problem-solving approach 3) that all participants have equal access to resources and opportunities to participate in discussions 4) that decisions usually are reached by consensus; and 5) that the relevant agencies are guided by the recommendations of the collaborating group (p. 142). Graham (2004) adds that collaborative efforts require the “openness to multiple sources of knowledge, a commitment to mutual responsibility for efforts requiring mutual investment and effort, and recognition of interpersonal relationships” (Depoe et al. 2004 p. 54). Cox (2010) explains that collaborative public participation comes in the form of “partnerships, community-based collaboration, citizen advisory boards, consensus decision making, and alternative dispute resolution models.” (p.123). Margerum (2011) adds that

collaborative efforts may take place in “consensus groups, councils, committees, and community-based collaboratives” (p. 6).

Collaboration occurs in many forms with a variety of different groups and given the conditions presented above, collaboration is not easily achieved (Margerum, 2013; Wondolleck and Yaffee, 2000; Innes and Booher, 2010). To produce effective collaboration, early authors focused on improving the process of collaborating. Later authors then added the importance of considering substantive and relational dimensions when seeking to develop more effective collaboration.

Drawing from negotiated order theory Gray (1989) depicts collaboration as a process or “a mechanism by which a new negotiated order emerges among a set of stakeholders” (p. 228) and explains that this theoretical perspective helps to view collaboration as “a dynamic, process-oriented theory of interorganizational relations and accounts for the contextual influences on interorganizational dynamics.” (p. 244). According to Gray the process of collaboration has three phases: problem setting, direction setting, and implementation. These three phases each involve a series of attributes.

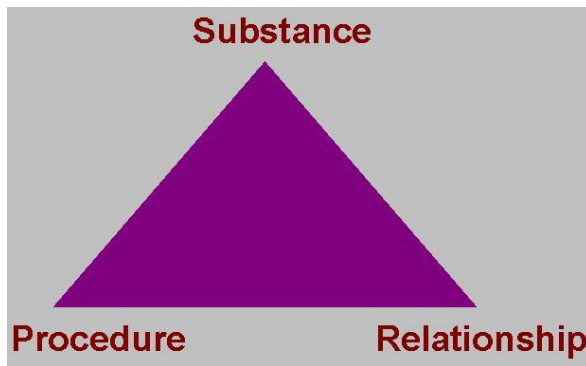
Figure 3 - Gray (1989) Phases of Collaboration



The process of collaboration outlined above is an ideal. Obstacles often arise as collaborative groups form and engage. “Ineffective management of the process, limited process skills, trouble in attaining representation of stakeholders, and difficulties in managing the interaction between the collaboration and the world around it can stymie the most well-intentioned efforts.” (Wondelleck and Yaffee, 2000, p. 63). Regardless of how the process may be interrupted, it is important to acknowledge that collaboration is a process through which stakeholders negotiate their roles and determine the nature and extent of their participation.

Other authors describe collaboration as more than just a process. Daniels and Walker (2001) present the Progress Triangle (Figure 4) as a tool for evaluating collaborative potential and explain that collaboration has substantive and relational attributes in addition to procedural ones. They assert that all three dimensions should be considered similarly, and then when combined they develop a deeper understanding of the collaborative potential of a group. The substantive dimension is concerned with better understanding the issues and what needs to be learned to address those issues. The relational dimension is concerned with who are the parties involved and how they interact with one another. The procedural dimension is concerned with how the group is working together and how they are making decisions. The additional dimensions add to the development of a more nuanced understanding of the nature of collaboration and expand the perception of collaboration as more than just a process,

Figure 4 - Daniels and Walker (2001) Progress Triangle



Collaborative approaches to environmental management

A number of environment and natural resource management scholars offer concepts and case examples that inform the nature of collaboration in the context of climate change adaptation. Koontz et al. (2004) describe the collaborative environmental management approach and emphasize the role of government in developing effective collaborations. Collaborative environmental management is “based on diverse groups including public and private, and non-profit stakeholders, working together to address environmental issues.” (p.21) The traditional role of government as the “expert, manager or enforcer” is not appropriate for such groups. There are a number of factors that influence collaborative processes and outcomes which include: Issue definition, collaborative resources, group structure and decision-making processes (Koontz et al. 2004). Mason (2008) explains that the collaborative land use management approach is more of a place-based approach to collaborative environmental management. This approach is specific to land based issues and focuses on engaging local communities where the environmental issue exists. Similarly, community-based natural resource management seeks to encourage

participation among communities of resource users in the process of decision-making (Armitage, 2005)

Daniels and Walker (2001) present the Collaborative Learning approach as a way to manage environmental situations where conflict is present. Collaboration is often characterized by decision-making and learning is foundational to making good decisions. The Collaborative Learning approach emphasizes shared learning through social interaction amongst stakeholders. The process of Collaborative Learning allows participants to engage in meaningful discourse as they edge towards a decision or decisions (Daniels and Walker, 2001)

Innes and Booher (2010) take a complex systems perspective when discussing collaboration and assert that a collaborative rationality approach is called for when situations require decision-making about complex issues. They explain that collaborative rationality is grounded in face-to-face dialogue where participants have the opportunity to present their unique perspectives and discuss them openly as the group strives to reach consensus on the issues at hand. Margerum (2011) also emphasizes the goal of consensus for collaborative groups in his discussion of collaborative planning and management.

Armitage, Berkes, and Doubleday (2007) present an adaptive co-management approach and explain adaptive management's roots in collaborative management and adaptive management. The co-management approach is characterized by formal collaborations that link, sometimes legally, local community stakeholders and government agencies. Adaptive management emphasizes the need for flexibility in decision making. The convergence in these two approaches results in adaptive co-management and is basically a more formal collaborative process that values flexibility and an iterative process of learning.

Community-based Collaboration

In 1999, a group of about fifty practitioners and academics met in Tucson, Arizona, to share ideas, experiences, and research efforts in the emerging field community-based collaboration in the natural resources and environmental management arenas. Sponsored by the U.S. Institute for Environmental Conflict Resolution, the meeting produced a new initiative, the “Community-Based Collaboratives Research Consortium” (CBCRC). With funding from the Hewlett Foundation and administrative support from the University of Virginia’s Institute for Environmental Negotiation, the CBCRC served for over a decade as a network for collaborative work, both in research and practice, taking place throughout the United States.

In 2011, members of the CBCRC produced a book, *Community-Based Collaboration: Bridging Socio-Ecological Research and Practice*, that features a set of essays reflecting the richness of this field. In an introduction, the book’s editors, Dukes, Firehock, and Birkhoff (2011) presented a definition of community-based collaboration:

(1) A group that has been convened voluntarily from within a local community to focus on a resource management issue(s) or planning involving public lands or publicly owned or regulated resources whose management impacts the physical, environmental, or economic health of the local community; (2) Was brought together by a shared desire to influence the protection and use of natural resources through recommendations or direct actions that will impact the management of the resource; (3) Has membership that includes a broad array of interest, some of which may be in conflict; and (4) Utilizes a decision-making process that requires participation by local stakeholders. (p. 2-3)

The literature on community-based collaboration significantly informs this research. Although the CBCRC did not research communities addressing climate change, the work that it featured is relevant to examining community-based climate change adaptation efforts. Researchers and practitioners affiliated with the CBCRC and similar organizations (e.g., the International Symposium for Society and Resource Management or ISSRM; the Environmental of Public Policy Division of the Association for Conflict Resolution or ACR; The International Environmental Communication Association or IECA) have considered collaboration in the fields of environmental management (Koontz et.al., 2004), public lands management and environmental conflict resolution (Clarke and Peterson, 2015; Daniels and Walker, 2001; Wondolleck and Yaffee, 2000), water resources management (Jarvis, 2014; Margerum, 2011; Innes and Booher, 2010; Sabatier et al., 2005), and land use management (Mason, 2008).

The literature on community based collaboration is predicated on the idea that local stakeholder involvement in decision-making has immense value for addressing complex natural resource dilemmas. The theoroids set forth by Leach (2011) in the seminal book developed by the CBCRC adds to the theoretical foundation for this research. Primarily the “implications” can be viewed as a set of guidelines that inform community-based collaborative initiatives.

Theoroid 1

Postulate: Each person’s welfare depends on the values, knowledge, and resources of others

Implication: CBCs are most collaborative when they address environmental problems systematically by involving representatives of every group with a stake in the outcome.

Theoroid 2

- Postulate: No two people interpret new information in precisely the same way because individuals' differing experiences and beliefs lead them to view the world differently*
Implication: CBCs are most effective when stakeholders first focus on developing a common understanding of the problems they seek to address.
- Theoroid 3
- Postulate: People's beliefs and values lie along a spectrum from fundamental to instrumental, and people often confuse their fundamental interests with their instrumental positions*
Implication: CBCs are most effective when stakeholders seek to invent novel policy positions that satisfy each other's fundamental interests.
- Theoroid 4
- Postulate: people value a fair process nearly as much as they value a fair outcome*
Implication: CBCs should devote time and effort to establishing, maintaining, and assessing procedural fairness
- Theoroid 5
- Postulate: People primarily define fairness as equal treatment of all parties*
Implication: CBCs should have impartial facilitators and clear process rules, faithfully implemented to give all parties equal opportunity to speak, vote, or veto
- Theoroid 6
- Postulate: People are highly sensitive to cues about their social status in groups*
Implication: CBC participants will view the process favorably if they are treated with civility and respect, and if their participation materially influences the outcomes of the process.
- Theoroid 7
- Postulate: People desire the right to self-determination.*
Implication: CBC participants will judge the process to be fair if they participate in convening the process and designing the ground rules that govern deliberation and decision-making.
- Theoroid 8
- Postulate: People are motivated by both private and collective costs and benefits of collaboration*
Implication: CBCs should provide participants a range of financial, institutional, and social incentives and should appeal to their personal sense of community and mission.
- Theoroid 9
- Postulate: People have positive discount rates, meaning they devalue the future costs and benefits of collaboration.*
Implication: CBCs are most effective when the participants have long-term perspectives or face relatively urgent problems
- Theoroid 10
- Postulate: People are generally risk averse (meaning they fear potential losses more than they welcome potential gains), and are wary of opportunities with uncertain outcomes.*

Implication: CBCs are most effective when the participants trust each other to negotiate in good faith and honor their commitments.

(Leach, 2011, p. 149-175)

Leach (2011) asserts that collaborative groups should maintain broad stakeholder participation through meaningful involvement and through the development of relationships based on trust and respect. He explains that the development of a mutually agreed upon goal and a process for achieving goals is necessary. He also asserts that collaboration is most effective when participants are committed to and value the collaborative process. Additionally, he describes participants' needs for incentives to collaborate and engage with one another in addressing mutual interests. These implications add to an understanding of how local groups can be most effective in their collaborative work.

Additionally, literature on community-based collaboration around environmental issues emphasizes that measurement of collaboration should be based on progress instead of success, and a number of authors agree. Measuring collaborative success is difficult for a number of reasons. First, "success" is highly subjective (Conley and Moote, 2003). One participant may perceive success based on their individually created criteria, while another may not perceive success because they are working from a different set of criteria for success. Second, success is often measured according to one viewpoint (Mason, 2008). One can measure the success of collaboration based on the ecological, relational, economic or policy outcomes. Thirdly, it is difficult to make a distinct connection between the cause and effect of a collaborative initiative. Although stakeholders may have contributed to a decision making process, the outcome of the decision exists in a complex system of other

decisions and factors that may be out of the control or power of the group. (Dukes et al., 2011) Lastly, it is often the case that success is measured directly following a collaborative initiative. While there may be some outcomes to measure at that time, it is more often the case that outcomes, especially ecological outcomes, are realized long after a formal project has concluded. Social outcomes including improved communication and interaction and knowledge and understanding can be measured upon completion of the project (Koontz, et.al., 2004). However, it is the ongoing and long term nature of these immediate outcomes that truly constitute a successful collaborative initiative.

Important Factors in Collaborative Groups

Scholarship and commentaries about environmental and natural resource management collaborations, both conceptually and empirically, suggest a number of substantive, procedural and relational attributes of collaboration relevant to community-based efforts that seek to adapt to climate change. The attributes described here specify foundational characteristics important for obtaining an understanding how groups are interacting and working together, and the extent to which they are doing so collaboratively, as they seek to adapt to climate change.

Purpose and Participation

Purpose

The development of a unified project purpose or the identification of a mutually agreed upon issue(s) to address is foundational to the collaborative work of a group (Gray, 1989; Wondolleck and Yaffee, 2000; Margerum, 2001; Innes and Booher, 2011). Bryan (2010) makes a distinction between shared ownership of a problem or the goals of the

group in addressing the problem, and compliance with the pre-existing goals or purpose. To be truly collaborative, he explains, the group must maintain shared ownership amongst the stakeholders. Margerum (2011) discusses the need for groups to have a common vision of what they hope to achieve given the purpose of the group. The process of identifying and agreeing upon the problem or issue that is going to be addressed by the collaborative effort is key to the success of the group (Gray, 1989; Margerum, 2011; Wondolleck and Yaffee, 2000; Koontz et al., 2004). This requires stakeholders to engage in dialogue to locate areas of overlap regarding their concerns, thus identifying areas of mutual interest.

Incentives

Participants are motivated, and have an incentive to participate and collaborate, if their interests are satisfied or accommodated by the purpose of the group. The process of aligning interests is important because if participants don't see that their issues are being addressed there is little to no incentive for them to work with other members in the group. If individuals are confused or uncertain about the direction of the project they are likely to avoid participation (Gray, 1989; Wondolleck and Yaffee, 2000; Margerum, 2011). There are many reasons why individuals participate in collaborative efforts. Gray (1989) cites several reasons. Some of which are: response to disruption or "turbulence", social, economic, and environmental change, lack of federal resources to address social issues, etc. Incentives to collaborate help shape the form of the collaboration and affect the path that the collaborative effort takes. Therefore, project conveners and leaders should create and highlight incentives for participants to collaborate (Wondolleck and Yaffee, 2000; Margerum, 2011).

Innes and Booher (1999) and Margerum (2011) describe the cost-benefit analysis that takes place when participants are determining whether or not they will participate. They explain that “stakeholders do not come out of altruism, solidarity, or community values” (Innes and Booher, 2010, P.103). Individuals participate because there is something in it for them and the benefits outweigh the costs. Keeping participants involved over the long term presents another challenge, however. Innes and Booher (2010) explain that people stay involved because of their personal interests. They stay engaged so that they can learn new information and build relationships with others in the group. In the end, they stay committed because they believe that the project is a worthwhile use of their time.

Decision-making

Decision-making is an important procedural attribute of collaborative groups (Margerum, 2011; Daniels and Walker, 2001; Margerum, 2011; Innes and Booher, 1999). Bryan (2010) and Innes and Booher (2010) both point out that collaborative group work is more akin to problem-solving than to decision making. Kim (2013) resonates this notion in her work and explains that addressing climate change is more about problem-solving than decision-making, though making a decision may arise from the problem solving work of the group. Regardless, collaborative problem-solving and decision-making, especially around complex scientific issues can be difficult.

Collaboration requires joint ownership of the decision(s) which means that stakeholders must continue to work together until they identify a mutually agreed upon decision (Gray 1989). Taking a consensus approach to collaborative decision-making has become increasingly more common (Margerum, 2011; Innes and Booher, 1999). Consensus is defined as “unanimous agreement or group solidarity” (Wondeolleck and Yaffee, p.) and

often takes a significant amount of time and effort to achieve (Wondolleck and Yaffee, 2000; Daniels and Walker, 2001; Margerum, 2011). Not all members of a group need to enthusiastically support a decision for it to be consensus, however. Often a consensus decision is reached even though individuals in the group may have reservations.

Collaborative groups have to be careful not to succumb to superficial consensus where individuals agree to a decision because they feel pressured to do so. (Daniels and Walker, 2001)

Gray (1989) and Margerum (2011) emphasize the need to involve stakeholders who have the capacity to implement any decisions the group might make. Collaborative efforts often fail and leave participants disappointed because the group did not have the capacity to implement the decisions made by the group (Margerum, 2011). The capacity to make decisions is conceptualized as decision space in the literature and is commonly understood as a determination of “what may be open for discussion and what cannot be negotiated.” (Dukes et al., 2011, p.207). Participants must be clear and transparent with one another about how and if their decisions can be implemented. Groups must consider who has decision-making power relevant to the goals of the group (Wondolleck and Yaffee, 2001; Margerum, 2011).

Roles and leadership

Roles

Collaboration requires the involvement of multiple stakeholders. The most effective collaborative groups involve key decision-makers, represent different interests, and include opinion leaders (Wondolleck and Yaffee, 2000.) Groups should strive to involve all of those necessary for achieving the goals of the group. When the stakeholder group is representative of the broader community, the result is a more acceptable outcome (Margerum, 2011; Leach, 2011)

The creation of collaborative groups involves making choices about who is most important or relevant under constraints of limited time and space (Margerum, 2011; Cox, 2010). In some cases participants are invited to the table and in others participants self-select and choose to engage with the group out of their own interest (Cox, 2010). Participants must view the selection of stakeholders as fair and inclusive for the collaborative effort to be effective (Margerum, 2011). When participants feel that key participants have been left out of the process they will hold negative or ill feelings toward the group and may distance themselves from the process. Conveners and/or project leaders are often responsible for determining who should be involved. Daniels and Walker (2001) caution that “the convening party should be sensitive about how other parties will perceive the consistency and fairness” of the selection process.

The roles that participants take on often determine the level and type of participation that ensues. Daniels and Walker (2001) define the array of roles that may appear in situations where collaboration is desired. The typology to follow depicts the array of participant roles that may be encountered in assessing collaboration in conflict

situations. This typology, though focused on conflict situations, is the most comprehensive list of stakeholder roles that may be present in collaborative groups.

- *Participant: This party has an interest in the situation but no strong positions. A participant wants to be involved in the situation but is not a primary voice for a particular point of view or outcome.*
 - *Advocate: This party holds a strong position on one or more of the major issues. An advocate is generally a primary stakeholder who is prepared to support a specific policy decision.*
 - *Representative: This party participates or advocates on behalf of a group or organization. The representative may or may not have decision authority from the party that he or she represents.*
 - *Decision-maker: This party has the authority to make and implement a decision. The decision-maker establishes decision parameters and decision space*
 - *Information provider: This party provides data or information pertaining to issues in the conflict situation. The information provider may see himself or herself as a “technical expert” or an important source of local knowledge.*
 - *Initiator: This party identifies a need for a process. The initiator may then become a convener or sponsor or seek parties to fulfill these roles.*
 - *Sponsor: This party provides public support for the process. A sponsor may simply lend its name to the process or may also provide resources (money, a site, supplies, speaker, etc.)*
 - *Convener: This party brings parties together and provides a venue. The convener may also participate in the process design.*
 - *Designer: This party designs decision-related processes appropriate for the conflict situation at hand.*
 - *Facilitator: This party guides the process in an impartial manner. The facilitator may be internal to the situation (eg. A member of an involved organization) or may be external (eg. A consultant.)*
 - *Evaluator: This party evaluates whatever processes may be employed for working through a conflict situation.*
- (Daniels and Walker, 2001 p. 165-166)*

A number of roles emerge in the literature as being pivotal to effective collaboration. Technical experts, conveners, and facilitators are all presented as pivotal participant roles. Additionally the literature describes the importance in having participation from

government officials, and emphasizes their decision-making authority. Lastly a growing body of literature on the importance of leaders in collaborative initiatives is revealed.

Stakeholders with technical expertise are viewed as important in natural resource collaboration contexts. Complex problems, like climate change, require the involvement of multiple sources of information (Gray, 1989; Moser, 2001) Those who have the expertise to develop a clear picture of the issue(s) are often required and technical support is often needed (Gray, 1989; Daniels and Walker, 2001; Wondolleck and Yaffee, 2000) Innes and Booher (2010) caution that although technical expertise is often needed, so is lay or “local” knowledge. Technical experts should seek to align their knowledge with local knowledge and should do so in a way that fosters two-way communication and dialogue, rather than the one-way information dissemination approach (Innes and Booher, 2010).

Conveners of a collaborative effort also maintain important roles. Conveners are those who “identify and bring all of the legitimate stakeholders to the table”. (Gray, 1989 p. 71) Collaboration conveners should consider the legitimacy of participants and should also recognize that level of participation will vary (Gray, 1989). Margerum (2011) emphasizes the importance of conveners and explains that they play a key role in determining who else participates, how the issues are presented or framed, and how the decision-making process is designed. Conveners are also often considered the leaders and hold significant positions of power (Margerum, 2011)

Guston (2001) discusses the role of boundary organizations in moderating how a group is convened, who participates, and the nature of their participation. Individuals from boundary organizations often serve the functions of translating knowledge to action,

mediating dialogue between parties, and clarifying information related to the goals of the group (Cone, n.d.) In this way, participants from boundary organizations play key roles in convening groups as well as facilitating the work that is done within those groups.

Facilitators also have significant roles in collaborative efforts. Margerum (2011) explains that the collaborative process “brings together a wide range of people to address complex, often controversial issues, so facilitation is an important factor in achieving results” (p. 88). Innes and Booher (2010) assert the need for skilled facilitators because they have the ability to “equalize power”, and they ensure that “everyone is heard respectfully, that they all have the same information, and that all have the capacity and the support to speak freely” (p. 111). Collaboration is based on participants’ ability to engage in discussion where individual opinions and views can be heard and challenged (Cox, 2010). Facilitation is need to keep this dialogue constructive and focused on informing the outcomes of the group.

Koontz et al. (2004) emphasize the important roles government officials play in collaborative environmental management situations. In their review of six case studies they found that government agents took on the roles of follower, where they are just there to participate, encourager, where they are involved in catalyzing the collaborative effort, and leader, where they are responsible for setting the agenda and guiding the group through the decision-making process. They also explain that governments bring to their roles technical and financial resources. The power positions that government officials hold are valuable for collaborative groups, especially that related to their decision-making authority. Dukes et al. (2011) explain that agency leaders often have decision-making

authority that directly relates to the implement-ability of collaboratively developed decisions. In the end, governmental officials are often viewed as the leaders of collaborative groups.

Leadership

The importance of leaders has been established in the literature and continues to be a point of interest amongst a number of scholars. After years of working in the field of collaboration, Walker and Daniels (2012) added the component of leadership to their previous work and they now emphasize the importance of leadership roles in collaborative natural resource management and decision-making processes. “Committed, inclusive, and visionary leadership in both agencies and communities is essential” for effective collaboration (p. 149). Leaders have the ability to push projects forward and they often “foster stakeholder trust and support for project goals” (Wondolleck and Yaffee, 2000 p. 178) Innes and Booher (2010) explain that someone has to be the catalyst for collaborative efforts and that is the job of community leaders. Dukes et al. (2011) also emphasize the importance of stakeholder leaders who have the legal authority to implement policies and laws developed through community involvement.

Leaders must respect the collaborative process and have a positive view of what the collaborative process can achieve. They must have existing relationships, or the ability to develop relationships, with the variety of stakeholders (Gray, 1989). They must lead by example and emulate the behavior they expect from participants (Wondolleck and Yaffee, 2000). Additionally, Innes and Booher (2010) posit that leaders must value deliberation and be willing to take direction from the broader group. In collaborative groups leaders

should present themselves as encouragers and capacity builders, rather than deciders and controllers.

Learning and sharing information

Collaborative initiatives offer a space for learning and sharing knowledge. (Gray, 1989; Daniels and Walker, 2001; Wondolleck and Yaffee, 2000; Poncelet, 2004) Knowledge takes on many forms. However in the context of environmental management it often appears as either scientific/technical or local/ indigenous/traditional. Scientific and technical information is characterized by the use of the scientific method to determine what is real or true. The latter, local, indigenous, or traditional ecological knowledge is derived from personal observations and experiences, and is often a cumulative interpretation of an issue based on cultural history or series of observations (Berkes, 1999; Dukes, et al., 2011) The type of information valued by the group depends on the structure of the collaboration and the issue(s) being tackled. Several authors point out that addressing environmental issues often requires technical information, though the local knowledge of participants is just as important and is often overlooked (Innes and Booher, 2010; Dukes et al. 2011; Daniels and Walker, 2001) Innes and Booher (2010) explain that incorporating lay knowledge is critical for collaborative decision-making. Lay knowledge includes “information about local settings as well as knowledge of specific characteristics, circumstances, events, and relationships” (p. 172).

McDaniels and Gregory (2004) differentiate between learning as a specific goal of a group and learning as a means to reaching other goals stated by the group. They explain that when learning is perceived to be the goal of the group, participants value the learning

process more. When learning is the end goal of the group, participants are more satisfied with their work, even in the absence of a definitive decision (McDaniels and Gregory, 2004).

Several authors emphasize the strength in learning together or co-learning, which is referred to in the literature under different concepts including collaborative learning (Daniels and Walker, 2001) joint knowledge production (Hegger et al., 2012), and joint fact finding (Wondolleck and Yaffee, 2000; Innes and Booher, 2010). The process of learning together involves inventing options together and taking time to develop mutual understanding of the issue and each other (Wondolleck and Yaffee, 2000) Mutual learning encourages participants to think beyond their own interests and explore ways to satisfy the broader interests of those in the group (Innes and Booher, 2010; Gray, 1989). Additionally, the process of learning together helps to build relationships among participants in the group (Innes and Booher, 2010; Daniels and Walker, 2001)

Social learning emphasizes the importance of relationship building in natural resource decision-making (Blackmore, 2007). It is the informal process of discussing and interacting with one another that results in exposure to new and different ideas, concepts, and behaviors (Poncelet, 2004). Daniels and Walker (2001) explain that the concept of Collaborative Learning accounts for the value of social learning and meaningful stakeholder interaction. The goal of Collaborative Learning is to “improve the quality of public decisions by improving social deliberation ...” (p.11). A more nuanced, deeper understanding of the issue(s) under consideration emerges when stakeholders share their information, their views, and their values, and learn from one another (Gray, 1989) Cone, Rowe, Borberg, and

Goodwin (2012) found that this is especially true in community planning for climate change.

Collaborative groups provide the space for and respecting the need for dialogue and discussion about the issues at hand. Learning often takes place when participants engage in discussions about the problems they face and their ideas for addressing those problems (Margerum, 2011; Innes and Booher, 2010). Through discussion participants learn from one another and have the ability to share their own unique perspectives and knowledge (Innes and Booher, 2010; Daniels and Walker, 2001) Additionally, through engaging in dialogue participants have the opportunity to constructively criticize each other's viewpoints and opinions (Daniels and Walker, 2001) The most collaborative groups foster dialogue and provide an avenue for individuals to present their ideas and opinions and express their interests with the broader group (Koontz et al., 2004; Wondolleck and Yaffee, 2000; Daniels and Walker, 2001)

Part Three - Adaptation and Collaboration

Numerous authors emphasize the role of the stakeholders in adapting to climate change and assert the importance of individuals, communities, and governments in making important adaptation decisions (Cohen and Wadell, 2009; Moser, 2013; Adger et al., 2009; Ensor et al., 2014; Schipper et al. 2014). The collaboration literature reviewed here clearly asserts the importance of stakeholder participation, especially as it relates to decision-making (Margerum, 2011, Wondolleck and Yaffee, 2001; Daniels and Walker, 2001; Dukes et al., 2011). Both bodies of literature also consider the roles of decision-makers and

leaders and underline the importance of information and learning. As such, this review of literature highlights the value of better understanding stakeholder participation and collaboration in the context of adapting to climate change.

Several authors have also attended to these matters in their research and have identified the significance in doing so. Cone et.al., (2013) sought to “encourage and facilitate collaboration among and between decision makers and coastal property owners to determine and implement appropriate responses to climate variability and change”. (p. 2) in order to foster learning about climate change as well as encourage adaptive action. In their work reviewing community collaboration efforts around climate change in the Canadian Arctic, Pearce et al. (2009) write “research on climate change impacts, vulnerability and adaptation, particularly projects aiming to contribute to practical adaptation initiatives, requires active involvement and collaboration with community members and local, regional, and national organizations that use this research for policy making”(p. 10). In their article titled “Fostering Multi-scalar collaboration and co-operation for effective governance of climate change adaptation” Leck and Simon (2012) argue that “there are very substantial synergies between successful climate adaptation and optimally functioning relational dynamics between all tiers of government” (p. 1235) Lund et.al. (2012) found in their work in Denmark that adaptation initiatives were enhanced through effective collaboration.

Several other authors also emphasize the salience of better understanding collaboration around climate adaptation. Moser and Boykoff (2013) reveal the importance of collaborative decision-making in their seminal book “Successful Adaptation to Climate

Change". Fussell (2007) writes that "adaptation planning requires close collaboration of climate and impact scientists, sectoral practitioners, decision-makers and other stakeholders, and policy analysts" (p. 273). Romsdahl (2011) proposes that collaboration between science and decision-makers "improves the relevance, compatibility, and accessibility of climate science information and can increase users' receptiveness. (P. 507) Ultimately, researchers have found that adaptation to climate change requires coordination and interaction of multiple stakeholders from a diverse set of institutional and organizational sectors (Jager and Moll, 2011; Fussell, 2007; Lorenzoni and O'Brien, 2009; Ensor et al., 2014; Pelling, 2011; Schipper and Burton, 2009; Moser and Boykoff, 2013) and they report the value of better understanding stakeholder interaction and collaboration around climate change adaptation.

Collaboration, in general, around adapting to climate change is a relatively new area of research. Several authors agree, however, that it is an important area of study and express a need for research and practical action in this area. Lemieux and colleagues (2015) have recently published research that investigated "institutional forces and factors that either currently inhibit or enable collaboration" (p.656) and find that there is a need for more research that informs collaborative approaches to making decisions about natural resources in the face of climate change. Camacho (2011) discusses the need for a "learning collaboratory" to better address how communities can react to impacts related to climate change. He also argues that the federal government in the United States has not paid enough attention to collaborative and adaptive learning in its direction for local communities to adapt. Other authors including Hegger et.al. (2012) and Fussell (2007)

generally acknowledge the need for a research focus on collaboration, given their experience with local climate adaptation efforts.

It is also important to note that significant attention has been given to the technical aspects of adapting to climate change (Barnett, 2010) and that research about the scientific basis of climate change is far advanced compared to research about the social impacts of climate change and the ways in which people are affected by environmental change (National Research Council, 2010). Romsdahl (2011) writes that “there is still a great need for evaluation of the various (decision-making) strategies being used.” (p. 532) Moser (2010) identifies a need for “practice-relevant”, locally based research that focuses on the human dimensions of climate change adaptation. There is a demand for practical research that focuses on “reaching out to practitioners, learning about their specific information needs, building trusting relationships, and actively engaging with them in knowledge co-production.” (Moser, 2010, p. 470). Building on this previous work Moser and Boykoff (2013) recently wrote about the need for more research that investigates the value of collaboration for understanding what it means to successfully adapt to climate change. Thus, there is a gap in the research that specifically focuses on group dynamics and the extent to which groups are collaborating when adapting to climate change.

Here I have reviewed two bodies of literature, climate change adaptation, and participation and collaboration around environmental management and decision-making. I have discussed the need and value for considering these two areas of interest together and established key areas to consider in doing so. I have also established the idea that

collaboration and adaptation are both processes, but that substantive and relational attributes should also be considered.

Understanding how groups work together in the context of climate change has become increasingly important in recent years. As noted earlier, climate adaptation measures are often the responsibility of various local and regional governments. Diverse groups of people must work together to make recommendations and decisions based on complex science. Studying community-based participation and group collaboration in the context of climate change adaptation will add to a growing body of literature that will hopefully help support future climate adaptation progress.

Chapter Three – Methodology

The need for case study research on this topic

This project employs a case study methodology to examine the nature of community-based groups focused on climate change adaptation and the extent to which they function collaboratively. The case study approach has been used often to study climate change adaptation (Climate Adaptation Knowledge Exchange, Environmental Protection Agency; Ensor and Berger, 2009; Pelling, 2011; Ford and Ford, 2011). Case studies of climate adaptation, however, have typically focused on the technical and scientific aspects of adaptive measures (Barnett, 2010). Fewer studies have assessed the group process, or organizational aspects (Cone, Johnson, Kelly, Winters and Stevenson, 2015). Although research has been conducted on community based approaches to climate change adaptation (International Institute for Environmental Development, 2009; National

Research Council, 2010; Fussel, 2007), human dimensions and group dynamics variables have not been prominent (Ford and Ford, 2011).

Additionally, much of the literature on collaborative environmental and natural resource management (e.g., Wondolleck and Yaffee, 2000; Innes and Booher, 2010; Margerum, 2011; and McKinney and Field, 2008) do not feature climate change adaptation cases. Goldstein's edited book on "collaborative resilience" (2011) features a case study of climate change adaptation but it is evaluated through resilience theory lens. Lemieux and colleagues (2015) have acknowledged the need for research regarding climate change collaboration, though the two case studies featured in their work were land issue based and specifically focused on governmental collaboration.

Case study approach

This research features case studies grounded in the idea that each case is a unique example of community-based groups working on climate change adaptation. Berg (2009) explains that case studies provide for rich understanding of the issues or phenomenon because the broader context is considered. This is an especially valuable approach to investigating communities. Berg (2009) defines case studies of communities as:

"the systematic gathering of enough information about a particular community to provide the investigator with the understanding and awareness of what things go on in that community; why and how these things occur; who among the community members take part in these activities and behaviors, and what social forces may bind together members of the community." (p.332)

Case study methods have been criticized for generating information that is not broadly generalizable. Nevertheless, support for the value of case study methods has grown

over the years (Berg, 2009; Flyvbjerg, 2006). “The case study is a necessary and sufficient method for certain important research tasks in the social sciences, and it is a method that holds up well when compared to other methods” (Flyvbjerg, 2006 p. 241). Flyvbjerg (2006) explains that case study research generates context-dependent knowledge that is understood and used by a variety of individual learners from novices and experts. He adds that many people understand the world through a series of unique cases that help create their perception of reality and he asserts that expertise is attained when an individual can draw upon the compilation of case study experiences they maintain (Flyvbjerg, 2006).

Case study research reveals the real-life experiences of community members, government officials, and agencies involved in climate adaptation and seeks to understand the processes that occurs when adapting (Penny, 2011; Eisenhardt and Graebner, 2007). Penney (2011) explains that case study research reports can be valuable for studying climate change adaptation in the following ways:

- *Motivates communities and local governments that have not yet committed to action with examples of others who have shown such leadership*
- *Demonstrates a variety of possible approaches to assessing community vulnerabilities and adapting to climate change*
- *Helps identify barriers to climate change adaptation and sometimes demonstrate innovative ways to get around these barriers*
- *Increases our ability to use a variety of tools that have recently become available for assessing risk and vulnerability and undertaking adaptation planning. (p.1)*

In addition to its value in assessing climate change adaptation, case studies are effective for studying collaborative processes. Dukes, et al. (2011) explain that case study methodology is often used to evaluate community-based collaboration. Koontz et al. (2004)

use a series of case studies to elucidate governmental roles in collaborative environmental management. Mason (2008) draws upon a number of case studies to assess collaboration in land use management situations. Daniels and Walker (2001) provide insights from the numerous collaborative learning projects they have directed (see also Walker et al., 2015).

Assessment Approach

I am using a multiple case study approach so that distinct cases and different communities can be compared. Yin (2003) explains that by using multiple case studies the researcher can develop more compelling findings than achieved by a single case. Such findings may offer insight that is important for better understanding how groups can improve interaction and effective collaboration in local climate adaptation projects.

These case studies are exploratory in nature. Yin (2003) favors a theory-before-research approach to help specify and frame what is being explored. Throughout this work I have drawn from a body of theories and concepts found in the literature on community approaches to climate change adaptation, collaboration, collaborative environmental management, and collaborative natural resource management. In this research project I explore the nature of group interaction and explore the extent to which these groups are working together collaboratively by applying four featured areas of assessment derived from the aforementioned bodies of literature.

The four areas include: Purpose and Participation, Roles and Leadership, Knowledge and Learning, and Climate Change Adaptation. The purpose and participation theme addresses the perceived purposes and goals of each project and asks why participants are motivated to be involved in the project. It also seeks to generally understand the extent to which the group is collaborative, and considers how decisions are made in this regard. The roles and leadership theme focuses on individual participation and how members contribute to the project. It specifically seeks to understand the role of leaders and leadership characteristics. The knowledge and learning theme seeks to better understand the types of information groups need, what is learned, and what kinds of information are valued. It also investigates the ways knowledge and information are shared. Lastly, the climate change theme considers how climate change factors into the work of the group. It first considers what specific issues related to climate change the group seeks to address. This theme also investigates the way climate change information is used and how climate change is talked about within the group. It also identifies the sources of climate change information in each project. The assessment approach is presented in four research questions with each main question comprised of a series of sub-questions.

Table 1 - Thematic Areas and Primary Authors

Thematic Area	Primary Authors
Purpose and Participation	Gray (1989) Dukes et al. (2011) Wondolleck and Yaffee (2000) Margerum (2011)
Roles and Leadership	Walker and Daniels (2012) Koontz et al. (2004)

	Innes and Booher (2010)
Knowledge and Learning	Daniels and Walker (2001) Mason (2008) Moser (2001)
Climate Change Adaptation	Adger et al. (2009) Schipper and Burton (2009) Ford and Ford (2011) Moser et al. (2013)

Research Questions

Research purpose: To explore the nature of community-based groups addressing climate change adaptation and to examine the extent to which they function collaboratively.

One. What are participants' views of purpose and participation?

- a. What is the project purpose?
- b. Why are participants participating in the project?
- c. How are decisions made?
- d. How do participants perceive group's collaboration?

Two. What roles are apparent and how is the group led?

- a. What roles are present and how do participants contribute in their roles?
- b. What roles are most important?
- c. What roles are missing?
- d. Who are the leaders and why are they perceived that way?

Three. How are knowledge and learning addressed?

- a. What knowledge and information is valued?
- b. What information was needed to fulfill the purpose of the group?
- c. What did participants learn?
- d. How is knowledge and information shared?

Four. How does "climate change" factor into the work of the group?

- a. What climate change issues are being addressed?
- b. How is climate change talked about?
- c. How is climate change information used?
- d. What are their sources of climate change information?

Study Site Selection

This research features four study sites. Site selection is based location, scale, and nature of the adaption initiative.

1. Location – Two case study sites from Oregon and two study sites from Maine.
2. Scale -- From each state one small local community/town and one more regional multiple communities.
3. Nature of the project – Local projects engaging multiple stakeholders in a process that is focused on adapting to, preparing for or responding to impacts associated with climate change.

Two case studies are from each state. Each state has a local (one town or city) and one regional (multiple towns/cities) project. Projects have been selected based on their stated purpose found in public materials about the project, in addition to cursory investigation about the nature of the project. Additionally, all of the projects have been active for at least a year. Case site details appear in Table 1.

Table 2 - Case Study Site Descriptions

Case Study	Scale	Time since inception	Purpose
Neskowin Coastal Hazards Committee	Local Population 150 This is an unincorporated community located in Tillamook county	3 years	“Recommend to state and county agencies and officials ways to maintain the beach and protect the community through short term and long term strategies; and explore ways to plan for and adapt to the potential future changes in the Neskowin coastal area.” (http://www.neskowincommunity.org/coastalhazards.html)
Ellsworth Adaptation Project	Local City Population = 7,800	1 year	Maine Sea Grant proposes to work in collaboration with the City of Ellsworth in downeast Maine to develop a community based adaptation model with a focus on stormwater and flood protection infrastructure. (http://seagrant.noaa.gov/Portals/0/Documents/what_we_do/climate/documents/NOAA_Sea_Grant_

			Community_Climate_Adaptation_Initiative.pdf)
Partnership for Coastal Watersheds	Regional (Coos Bay, Bandon, Charleston and North Bend) Population 29,000	2 years	“A collaborative effort among public and private sector citizens in the coos community to develop locally driven approaches to responsible development and to help prepare for climate-related changes on Oregon’s south coast.” (http://www.partnershipforcoastalwatersheds.org/)
Sea Level Rise Adaptation Working Group Saco Bay, Maine	Regional (Biddeford, Old Orchard Beach, Scarborough, Saco) Population 65,800	6 years	to review information from the recent Coastal Hazard Resiliency Tools Project that has analyzed the problem of sea level rise, and then develop an action plan that will set out a road map for how the group will estimate regional vulnerabilities, identify regional objectives to address such vulnerabilities, and provide implementation strategies for regional solutions. The SLAWG shall limit its scope to its defined region, which shall consist of any coastal estuaries, marshes and beaches subject to tidal influence and storm surges, whether by fresh or salt water, as well as any associated developed areas, roads, and other infrastructure, within the four member municipalities. (http://www.sacomaine.org/departments/boards/slawg.shtml)

The selection of case study sites was also contingent on access to the case study communities. To gain access to research sites I relied heavily on the professional contacts I cultivated through prior research endeavors. In 2010 I was contracted by Oregon Sea Grant to conduct interviews and develop a white paper for the Neskowin Coastal Hazards Committee. As a result of this work, I got to know members of the Neskowin group. As I

began conceptualizing my dissertation investigation I realized the value in researching this group and others like it. Beginning in late 2010 I participated in a team led by Gregg Walker and Todd Jarvis that worked with the Partnership of Coastal Watersheds in Southwestern Oregon. Over the course of two years the team facilitated discussions and conducted evaluation research with Partnership participants. I recognized that I might include this group as part of a case study site so I purposefully adopted a neutral, third party role. I did so as well with the Neskowin group. Once the Walker-Jarvis contract with this group was fulfilled I added this project as my second case study site.

Though I had identified two case study sites in Oregon, I wanted to consider another coastal region as well. Doing so would provide a basis for comparing not only communities, but regions. I quickly found that case study sites that met my aforementioned criteria were limited. Consequently, I consulted with my colleagues at Oregon Sea Grant to find and gain access to additional study sites. I focused my attention on identifying study sites in Maine. Oregon and Maine Sea Grant programs have engaged in collaborative research in the past, given that Oregon and Maine are similar in many ways. Cone et al.(2013) explain that both states maintain primarily rural coastlines and rely on natural resource extraction, including fishing and aquaculture. The primary difference between the two states is that Oregon maintains public ownership of its beaches while Maine coastal property is primarily owned by private landowners. Joe Cone of Oregon Sea Grant put me in contact with Maine Sea Grant professionals who then told me about climate adaptation projects occurring in Maine. I acquired contact information for participants in two active projects that met my selection criteria.

I felt that it was important to spend time building relationships with the two Maine projects, as I had done in Oregon. Once I made initial contact, I planned a relationship-building trip to Maine. In March 2013 I spent three days in southern Maine with the Sea Level Adaptation Working Group (SLAWG) and two days in Ellsworth, Maine, meeting and talking informally with project participants in both locations. The purpose of this trip was to build trust with the groups, prior to conducting interviews. After returning to Oregon, I maintained contact with the Maine communities by remotely attending meetings and via phone calls with Maine project members.

Data Collection

To better understand the work being done in these study sites I began my investigation by reviewing websites, reading meeting minutes, and evaluating documents produced by the groups and their affiliated organizations. I also learned more about the broader communities where these projects were taking place by assessing census data collected in 2010 and spending time in each community talking with local citizens and walking around the communities to get a better feel for the areas where this work is taking place.

Semi-structured interviews were employed to gather detailed information about the four case study sites. Thirty-nine interviews were conducted in total (n=39). From the study sites in Maine, eight people (out of nine) participated from the Ellsworth Climate Planning Project and eight people (out of twelve) were interviewed from the Sea Level Adaptation Working Group (SLAWG). In Oregon, twelve (out of 18) members of the Partnership for Coastal Watersheds (PCW) were interviewed and the Neskowin Coastal Hazards Committee (NCHC) case included eleven interviews (out of thirteen).

I sought to interview as many participants in each project as possible, given time constraints and participants' willingness to be interviewed. In total I interviewed 39 out of 52 possible participants which provided a response rate of 75%. All interviewees were adults over the age of 18 who have been participants in the case study projects.

Participants included local citizens, land and business owners, government agency staff, elected municipal officials, university faculty and representatives from non-governmental and nonprofit groups.

Interviewees were invited by project conveners in each location to participate in the study. I provided project conveners in each case study site with a two-page research prospectus. After consulting with their constituency, my contacts indicated which members of their group were interested in participating in my study and provided me with their contact information. Participants were then contacted using a study recruitment e-mail. Meetings were then set-up with participants and interviews were held. All but one interview was conducted face-to-face, the other was conducted over the phone. Interview locations included public libraries, municipal and agency offices, and homes. Audio from the interviews was digitally recorded and participants were informed, via the verbal consent form that the audio recording would be for research use only, and that their answers would be confidential.

Interview questions were designed to assess the four areas of interest as posed by the research questions. During the interviews clarifying questions were asked and answered. In some cases I was unable to procure direct responses to interview questions, when and where appropriate I tried to direct attention to the question at hand. However, to maintain rapport with interviewees, in some cases where they were unable, unwilling, or

uninterested in answering the questions I moved on to the next question. Also, in situations where the questions I intended to ask had already been answered I skipped over those questions for the sake of not being redundant or appear as if I wasn't listening, again to maintain rapport with interviewees.

Presentation of Findings and Data Analysis

Interview recordings were transcribed and analyzed using NVivo software. Bazely (2007) explains that in qualitative research the terms “concept”, “category”, and “theme” are often used interchangeably. Alternatively, social science researchers using NVivo software code their data into “nodes”. Parent nodes don't typically store information, though they house child nodes that do store coded information. A list of parent and child nodes was developed from this initial analysis, and also in consideration of the research and interview questions. I then refined the child nodes by coding one interview from each case study site. Once the final list of child nodes was devised all of the transcripts were coded accordingly.

Babbie (2002) describes qualitative analysis as a non-numerical representation that describes observations and the phenomena that those observations reflect. Qualitative analysis relies on the categorization of observations that can then be coded into themes or what I am calling “nodes”. Themes or nodes, then, present the primary points of analysis under consideration. Patton (1990) also writes about the nature of qualitative research and explains that it is characterized by inductive analysis, the collection of descriptive (qualitative) data, involves reliance on personal contact and insight, and understands that each case is unique and grounded in social, historical, and temporal contexts.

Table 3 - Coded themes

Parent Nodes	Child Nodes
Purpose and participation	Collaborating Decision making Incentives Purpose
Roles and Leadership	Your role Others roles Roles missing Roles developed Leadership
Knowledge and Learning	Information valued Information needs Learned Sharing Knowledge and information
Climate Change	Climate change info source Issues addressed Language Used

*An additional theme of “Adaptation stages” was also coded and was integrated into my overview of case study sites that appear at the beginning of the findings chapter.

Given what is known about the nature of qualitative inquiry I analyzed my data using a three part process. In the first round of coding the data I placed large text blocks of information in each of the child nodes. A second review of the data involved cutting out language that was unnecessary or irrelevant, thus condensing the data down to what was most valuable. A third review of the data was designed to identify ways to present findings in a way that would be meaningful, interesting, and easily digestible for readers. The results of this work are presented in the findings section.

After findings were presented, I analyzed these results by looking for key areas of interest, given my understanding of the literature that grounded this work. My analysis of findings logically fell into four categories including: Local and Regional considerations, Matters of Substance, Matters of Procedure, and Matters of Relationships. The analysis linked findings with literature and my observations. The result was a series of observations and inferences about the nature of community-based group participation and collaboration around climate change adaptation. This analysis also yielded directions for future research in this area of interest.

Methodological limitations

Although doing semi-structured interviews and using a case study approach was most useful and logical for my investigation, I must note a few limitations. First I would be remiss if I did not mention that my time spent with each of these communities varied. I live and work in Oregon, and have been more involved in the two Oregon projects, so I have spent more time with these projects and have had the opportunity to do more observation in these case study sites. To compensate for this difference I made two trips to each of the Maine case study sites. The initial trip was focused on meeting project participants and getting to know the communities more. I spent three days in each area initially and I did not conduct any formal data collection at that time. I did all of my data collection in my second visit to Maine and I spent five days in southern Maine and four in Ellsworth. Also during my second visit to Maine I was able to do some observation of the SLAWG group as they had scheduled a meeting during the time that I was visiting. I also called in to two SLAWG meetings prior to conducting data collection. The only project where I did not

observe interaction between participants was in Ellsworth because this group was still forming at the time of my investigation. In addition, they rarely all met as a large group. I should also note that prior to my investigation and citing of case studies in the state of Maine I had spent significant time on the southern Maine coast. In the end, I spent the least amount of time and had the least amount of familiarity with the case study site in Ellsworth.

I should also note that case study sites were not randomly selected. Case study sites were chosen based on the selection criteria I identified early on. Access to these case studies, though, specifically the two in Maine and the one in Neskowin, was granted primarily through my professional affiliation with Oregon Sea Grant. This affiliation affected which case study site I was able to access and may have affected how I was perceived by participants in those sites. Though I did not ask participants how they perceived me as an interviewer, I was aware of the fact that their responses were likely tailored to their perception of what I wanted to hear. Additionally, in the Partnership for Coastal Watersheds project I had done previous data collection as part of an evaluation research project Gregg Walker and others were contracted to conduct. My previous interactions with this group may have affected the data I collected in this case study site.

Chapter Four - Findings

This research explores the nature of community-based groups working on climate change adaptation and investigates the extent to which they are doing so collaboratively. I visited

four coastal communities, two in Oregon and two in Maine, to pursue my research purpose. Interviews have been conducted with members of these four communities to explore a variety of issues central to the function of a community-based group. These include the thematic areas of purpose and participation, roles and leadership, knowledge and learning, and climate change. This chapter presents the findings from those interviews. Prior to that discussion, the four communities and background information regarding their climate change adaptation work are presented.

*Note that throughout this presentation of findings I use the terms stakeholder, participant and individual interchangeably. All of these terms refer to individuals participating in the projects considered here. I also use the terms adaptation, climate adaptation and climate change adaptation interchangeably. All of these terms refer to the process of adaptation, per the IPCC definition presented in the review of literature.

Table 4 - Interviewee Chart

	Neskowin Coastal Hazards Committee	
1	NP#1	University Scientist/Researcher
2	NP#2	Sea Grant Representative
3	NP#3	County commissioner
4	NP#4	State Agency Representative
5	NP#5	State Agency Representative
6	NP#6	Local community member
7	NP#7	Local community member
8	NP#8	Local community member
9	NP#9	Local community member
10	NP#10	Local community member
11	NP#11	Local community member
	Ellsworth Adaptation Project	
12	EP#1	Sea Grant Representative
13	EP#2	City Planner
14	EP#3	University Scientist/Researcher

15	EP#4	Assistant City Planner
16	EP#5	County planner
17	EP#6	Sea Grant Representative
18	EP#7	City Manager
19	EP#8	University Scientist/Researcher
	Sea Level Adaptation Working Group	
20	SP#1	City planner
21	SP#2	State Agency Official
22	SP#3	Regional Planning Commission Representative
23	SP#4	Local community member
24	SP#5	Assistant City Planner
25	SP#6	City planner
26	SP#7	Former Regional Planning Commission Rep.
27	SP#8	City Planner
	Partnership for Coastal Watersheds	
28	PC#1	Local community member (economic development)
29	PC#2	State Agency official
30	PC#3	Local community member
31	PC#4	Community development representative
32	PC#5	State agency representative
33	PC#6	National Estuarine Research Reserve Rep.
34	PC#7	Watershed Association Representative
35	PC#8	Local community member (tribal affiliation)
36	PC#9	Watershed Association representative
37	PC#10	Municipal official
38	PC#11	Local community representative
39	PC#12	Local community representative

Margerum (2011) asserts that collaborative groups appear in three forms and he offers a typology of each. “Action” oriented groups are typically engaged in on-the-ground activities. In some cases these groups engage participants in citizen science as they seek to, for example, restore a particular habitat. Alternatively, “organizational” groups are focused on achieving the goals of a particular organization or group. In these groups, members are tasked with helping an agency satisfy its interests and needs. Lastly, “policy” oriented groups are designed to develop or change legislation, laws and rules. These groups may be involved in the creation of management plans or the development of binding documents. Table depicts the type of groups each case study is most oriented toward.

Table 5 - Type of Group

Type of Group Chart

Group	Type
Neskowin Coastal Hazards Committee	Action

Partnership for Coastal Watershed	Organizational
Ellsworth Adaptation Project	Policy
Sea Level Rise Adaptation Working Group	Policy

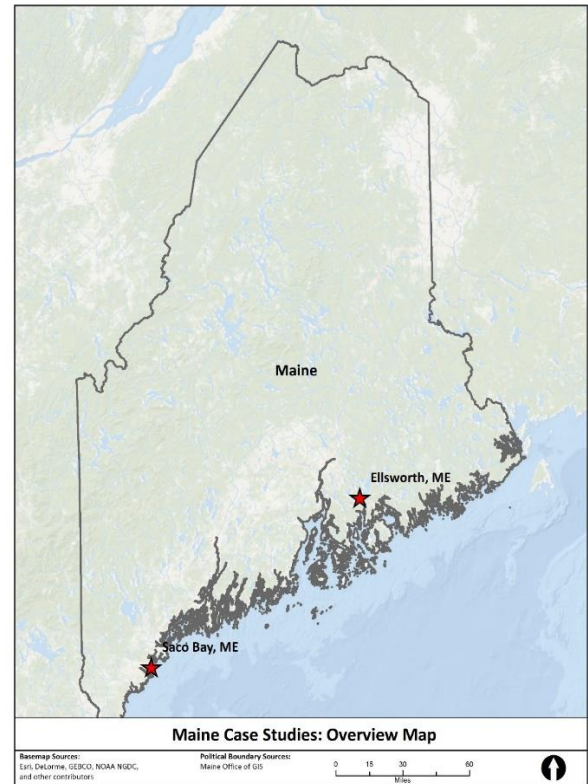
Case Study Sites Overview

Figure 5 - Oregon and Maine Case Study Sites Maps



(NCHC), Neskowin, Oregon

The



Neskowin Coastal Hazards Committee

Figure 6 - Neskowin Coastal Hazards Committee Case Study Map



Neskowin Oregon is an unincorporated community in Tillamook County just north of Lincoln City (see Figure X). The community is comprised primarily of second-home owners, though there are a number of residents who also live there year round. Over the past several years winter storms have caused significant erosion of the beach and have flooded low-lying areas. The Neskowin Coastal Hazards Committee was formed in 2009 by a group of interested citizens concerned about the beach erosion their community was experiencing. Early in the creation of the group several members of the Neskowin Community Association approached the Tillamook County Commissioners about beach erosion issues and asked for the County's participation and help in addressing these issues.

One county commissioner agreed to participate in the committee. Meanwhile, representatives of state agencies with jurisdiction in the area, including the Department of Geology and Mineral Industries, Oregon State Parks, and the Department of Land Conservation and Development (DCLD) also began interacting with the group. Oregon State University researchers and Oregon Sea Grant were also participating in the group.

At the time of my data collection in April-May 2013 the group had been meeting on a monthly basis for almost four years. In that time they gathered information germane to making decisions about what to do about their beach. They formed two subcommittee groups aptly named “active protection” and “land use”. In the realm of active protection the group realized early on that although they had access to good information about what was happening in their community, it was not specific enough to their unique concerns. The group decided that they needed a detailed assessment of the active protection options and hired a consultant for that purpose. Funds to support the assessment came in part from DLCD and in part from monies procured through the solicitation of funds from the broader community. On the land use side, draft ordinances were written, with the help of DLCD to address the long term planning needs of the community, specifically related to the low lying, more vulnerable, areas of the community. Working under the observance of the Tillamook County adaptation plan, the NCHC crafted land use ordinance specific to their community, but in accordance with the broader county plan.

The Partnership for Coastal Watersheds (PCW), Charleston, Coos Bay, North Bend, and Bandon, Oregon

Figure 7 - Partnership for Coastal Watersheds Case Study Map



The project area includes a southwest Oregon coastal region, within which are the cities of Coos Bay, Bandon, North Bend and Charleston, Oregon, with the latter serving as the core community (see Figure X). This region is diverse. Bandon is home to a number of golf courses, including Bandon Dunes, a world renowned course that draws high income visitors to the area. Conversely, even though the region also includes well known state parks and a national estuarine research reserve, the cities of Coos Bay North Bend and the unincorporated community of Charleston are less developed and have struggled significantly with economic development. The Coos Bay region is also home to members of

the Coquille tribe who have a rich heritage and a deep connection to the area . In the past the region relied heavily on timber resource extraction, but with changing policies and fewer demands for lumber the region has been forced to re-invent itself. The area now still relies heavily on resource extraction and fisheries industries for economic development, though growth in this area has slowed, in part due to environmental concerns on behalf of the community.

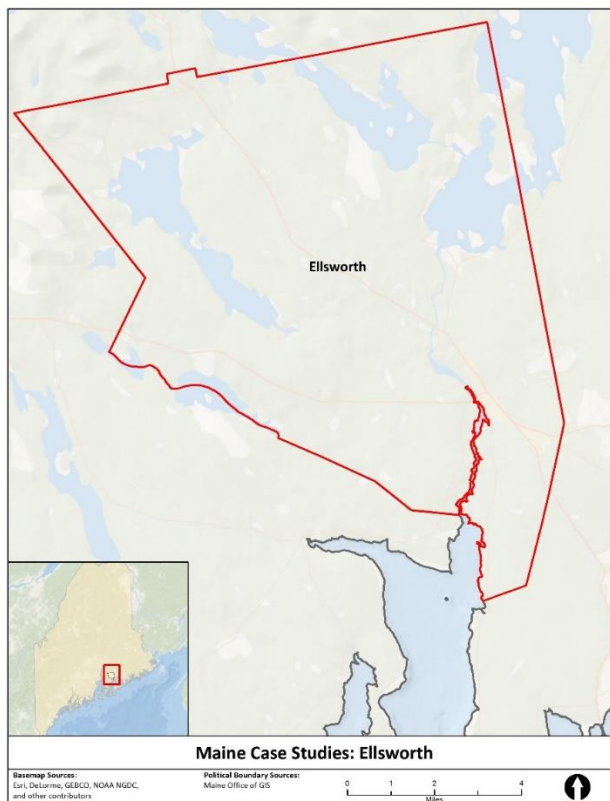
The Partnership for Coastal Watersheds is a project initiated by a relationship between the Coos Bay Watershed Association (CWA) and the South Slough National Estuarine Research Reserve (SNERR). The group was convened in 2010 making it about three years old at the time of data collection. Of the four projects, I was most closely integrated into this one. My advisor and a team of graduate students were asked to facilitate meetings and conduct evaluation research for the group. Given my close connection with the group I consider myself a participant observer of this project.

The Partnership was created after a grant was awarded to the SNERR and CWA to conduct work related to climate change adaptation. Representatives from both organizations selected individuals from the community, industry, county and local government, and state agencies to participate in the project. This community has a history of conflict between those passionate about resource extraction, and those concerned with economic growth, and those who are passionate about environmental protection. The project existed in one form under “Phase One” and was transitioning into “Phase Two” as I was doing data collection. In the initial meetings of Phase one the project drew a large, diverse group of people (about 35 individuals were participating early on). Over time the group dwindled

significantly. The attrition of group members became an issue for the project leadership and other group members. Phase two was an attempt to revitalize the group's efforts to achieve its goals.

The Ellsworth Adaptation Project (EAP), Ellsworth, Maine

Figure 8 - Ellsworth Adaptation Project Case Study Map



This case study is the least “coastal” of the four, but in an area with strong economic and ecological ties to the coast. Ellsworth is often referred to as the “gateway to Acadia” and (Acadia National Park and Mount Desert Island). It is located in down east Maine and although it does not have a coastal frontal zone it has several tidal rivers and streams that feed into the ocean. Like many municipalities city leaders would like to increase development, especially in the downtown area, though they recognize the need for smart

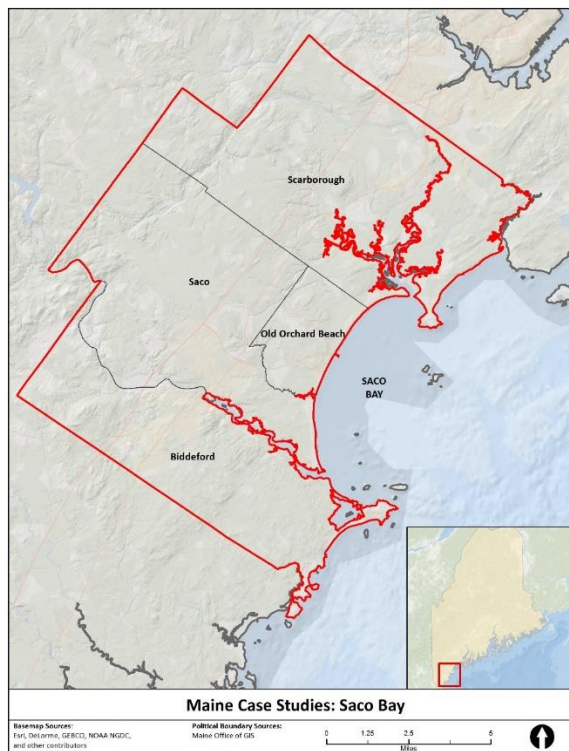
growth given the environmental issues they already face. The Maine Department of Environmental Protection identified Card Brook, a small tributary of the Union River, located in Ellsworth as not meeting water quality standards under section 303 (d) of the Clean Water Act. The impairment is attributed, according to the DEP, to impervious surface runoff causing an overabundance of pollution to seep into the waterway. Given these conditions, city officials were specifically focused on alleviating the water quality issues. However, after the city land-use planner attended an information session about expected increases in heavy precipitation events under climate change put on by scientists and engineers from University of Maine and in association with Maine Sea Grant, she became interested in learning about how their water quality issues may be exacerbated or improved depending on expected changes in water quantity. Following the presentation, the land-use planner from Ellsworth approached representatives from Maine Sea Grant and they began discussing the needs of the Ellsworth community and ways that Maine Sea Grant and researchers from the University of Maine might be able to help them better understand and address their concerns.

The Ellsworth Adaptation Project is the youngest of the four case studies. At the time of formal interviews the project had been in place for just about a year. Researchers from Maine Sea Grant and the University of Maine were awarded a grant to pursue applied research work with a local community interested in obtaining and utilizing the technical and scientific information researchers at the University were developing related to changing environmental conditions in the region. When the planner from Ellsworth approached Maine Sea Grant and University of Maine researchers it was timely because while the city was looking for information they needed to make decisions about how to

manage their water quality issues, researchers from the University of Maine were also looking for a community where they could work to apply their scientific and technical data in a meaningful way.

The Sea Level Adaptation Working Group (SLAWG) - Biddeford, Scarborough, Saco, and Old Orchard Beach, Maine

Figure 9 - Sea Level Adaptation Group Case Study Map



At about five years old at the time of data collection, the Sea level Adaptation Working Group is the most established and longest running of the four case studies. The project is a joint venture between the towns of Old Orchard Beach and Scarborough, and the cities of Saco and Biddeford in the Saco Bay region of southern Maine. The area is home to a number of year round residents, though in the summertime it transforms into a popular tourist destination for northeasterners and eastern Canadians. The town of Old Orchard Beach has a waterfront amusement park that is well-known to the area. Additionally, the

Saco Bay region has the largest continuous stretch of beach in the state and is also valued for the coastal marsh habitat that exists there.

The Sea Level Adaptation Working Group was convened in 2008 by Southern Maine Regional Planning Council and the Maine Geological Survey. Conveners asked each town to have their land use planner and another community member participate in the group. Funds for this project were provided by the Maine Coastal Program and were set to provide staff time for a five year period. That five year period was coming to a close at the time of data collection and the group was considering what they could do to move forward with the group, and what they could do to procure more funding to do so.

The project has always focused on the specific climate change impact of sea level rise. The city of Saco maintains a highly vulnerable area known as Camp Ellis. This area is prone to significant erosion and flooding. The increasing frequency and intensity of storms and wave run-up have destroyed homes and infrastructure in this area several times. The city of Saco has become the poster child for losses related to sea level rise in the state of Maine. Pictures of the Camp Ellis area flooding and erosion are consistently presented in news media around the area. Other areas of Saco Bay have also experienced flooding impacts and loss of homes and damage to infrastructure, though not as frequently or severe.

When the group was formed representatives the four towns signed an intergovernmental agreement to pursue options for managing Sea level rise in all four of the communities. The group decided after much deliberation that it would pursue the advancement of a policy/ordinance change in each of the four communities to increase the freeboard space under new and renovated homes by an additional three feet. The only town to adopt this

measure was Saco. In the end, the other town councils decided that they would not pass the ordinance.

Purpose and Participation

The first research question asks about each project's purpose, why people participate, and the extent to which they do so collaboratively. Specifically:

What are participants' views of purpose, participation, and decision-making?

- a) What is the project's purpose?
- b) Why are participants participating in the project?
- c) How are decisions made?
- d) How do participants perceive the group's collaboration?

Project Purpose

Each of the four projects developed their purposes and objectives differently. In Neskowin, the group engaged in meaningful dialogue as they co-created their purpose and goals before setting out to achieve them. The PCW struggled to identify goals that worked for all members in the group, which was not surprising given the history of disagreements amongst diverse stakeholders in the past. Many felt that the goals of the group had already been established by the leadership and they were just there for the ride. In Ellsworth, group conveners set the purpose of the project prior to finding a community where they could work to achieve their goals. The project purpose however appeared to bifurcate based on the different interests of the researchers and municipal officials. In the SLAWG project the goals of the group were clearly laid out by the project conveners

and then participants were asked to join the group based on their agreement with the goals of the project. Participants then signed an intergovernmental agreement about what they were doing and why.

Neskowin Coastal Hazards Committee

The NCHC's project purpose is:

"Recommend to state and county agencies and officials ways to maintain the beach and protect the community through short term and long term strategies; and explore ways to plan for and adapt to the potential future changes in the Neskowin coastal area."

(<http://www.neskowincommunity.org/coastalhazards.html>)

The group is unified in its two-fold mission that they created together to "protect the community and save the beach". The majority of respondents quoted this mission statement when asked about the project purpose. Some noted the level of attention they gave to co-developing the mission statement so that it would truly reflect the group's interests. Early on the NCHC spent some time crafting the purpose statement and they used that mission statement to guide their work. One of the Neskowin participants explained:

"The formal mission statement was word-smithed at the great expense of a lot of time to get it just right. The forming partners of the committee wanted it because everyone wanted to make it really clear because we wouldn't want to do anything until we knew what we were doing. So it was a good disciplined approach."

They recognized the difficulty in achieving both goals, since they seemed somewhat at odds. Eliminating or limiting the amount of shoreline hardening (ie: riprap) could expose the community to more flooding and protecting the community by hardening the shore could cause an increase in erosion along the beach. The group really set out to explore ways that both goals could be met. Another participant stated:

“The fact is that there’s hardly anything we can do to protect the beach and save the community. Pretty much we have to pick one or the other. If we armor the shore to protect the community it tends to destroy the beach. And if we let nature take its course there’ll always be a beach but there might not be a community.”

The NCHC was formed after several people in the coastal frontal zone were impacted by coastal erosion. The low-lying coastal frontal area of the Neskowin community is primarily built on fill that was then secured in place by invasive grasses. This area is subject to shoreline change and is also where many expensive homes have been built. Issues arose over shoreline hardening and the placement of revetments also known as riprap. A presentation by scientific experts from Oregon’s Department of Geology and Mineral Industries (DOGAMI) and Oregon State University to the community showed that the flooding and erosion issues they are experiencing will likely get worse over time. Following this presentation, a few members of the group decided that something needed to be done to address these hazards. Once the group began developing options for addressing the issues they formed two subcommittees. A participant stated:

"It is driven ultimately by financial problems that some of the individual players have had and to deal with their revetments in front of their houses and the knowledge that these issues have been getting worse recently and will probably get worse in the future."

A participant highly active in the group explained that the group sought to address their issue by forming subcommittees to work on "active protection" and "land-use":

"There are two main parts and that is the land use and active protection. It's my belief that the active protection is going to be more difficult to achieve than the land use side because the active protection is going to take dollars and dollars are tough to raise."

Partnership for Coastal Watersheds

As reported on its website:

"The Partnership for Coastal Watersheds (PCW) is a collaborative effort among public-and private-sector citizens in the Coos Bay community to develop locally-driven approaches to responsible development, and to help prepare for climate-related changes on Oregon's south coast."

(<http://www.partnershipforcoastalwatersheds.org/>)

My interviews with PCW members revealed that the purpose of the PCW was clear to some members and unclear to others. The conveners of the group (the Coos Watershed Association and the South Slough National Estuarine Research Reserve) had a clear idea of

what the project was about, but they had a difficult time conveying the purpose to the people invited to participate in the PCW. Several PCW participants thought that the project conveners were being purposefully obtuse about the objectives of the project and some took issue with what the project was “about”. Some believed the project was more about compiling scientific and technical information while others thought that it was more about getting people to work together. This reflected a long-simmering tension in the region. It had experienced a great deal of conflict between parties concerned about preserving natural resources and parties who advocate for economic growth and support extractive industries, such as mining and timber. Therefore when participants came to the table many were uncertain about what the project was about and how it might affect their interests.

The interview question about the purpose of the Partnership for Coastal Watersheds solicited a variety of answers.

One PCW member stated:

“The purpose of the project was foster collaboration amongst a variety of stakeholders and develop an understanding of what watershed issues are of importance.”

In contrast, another PCW participant noted:

“I have no idea what the purpose of that project was I still have no idea. I still do not understand the absolute intent. The primary purpose of that project remains unclear to me.”

Another PCW member replied in depth:

“The purpose of the project as I understand it is to take and establish and use existing information associated with environmental issues with the bay from a variety of different

aspects... Habitat, climate, water conditions, pollution, all of those factors and look at the watersheds and the relations and all that type of stuff and compile it into one document or one location so that this information can be obtained readily and easily by the general public or whoever is needing it.”

Project conveners acknowledged that the purpose of the project, and the reason they stated for the purpose of procuring funding, was two-fold though they had a difficult time communicating this with the broader group. First, the PCW would address issues related to changing environmental conditions in the watershed. Second, the PCW would provide members with an opportunity to collaborate on watershed-related issues; to work together constructively, despite a history of opposition and division. As the PCW evolved through a number of meetings, some members became disenchanted with the process and the goals of the project became increasingly unclear.

One project convener stated:

“We have had a hard time from the very beginning helping the steering committee really get what we were trying to do.”

* Project conveners referred to the broad stakeholder group as the “steering committee”.

The difficulty in communicating the two-fold purpose of the project to the stakeholder group contributed to the high rates of attrition the group experienced early on. One participant from the community explained that:

“The original PCW program which was to simply analyze the estuary and marine environment in the south slough and coastal watersheds and to assess

the risks of rising sea waters. Quite frankly that program morphed into 40 dozen things that weren't pertinent and frankly I don't know where it ended up."

Another member specifically discussed the loss of participation and attributed it to the lack of purpose clarity:

"And that may or may not be why people dropped out I think it's because they didn't see a direct purpose for what the point was of the group... the group just didn't know what the specific goal was and I think some people were thinking okay I'm spending my time on this I need to know why and what I'm going to get out of it."

Many participants agreed that the group needed a more specific purpose if it was going to move forward. They had a difficult time understanding what they could contribute, given the lack of clarity of the project purpose. One participant asserted that they need a specific purpose to really understand the ways in which they may or may not be able to contribute to the project:

"The project has to get really specific on what it is that you want me to contribute to, what information do you need, and what is the question that you want me to answer?"

Ellsworth Adaptation Project

The Ellsworth Adaptation Project was initiated:

..." to address impacts on communities from extreme rain events. How best to make plans and decisions related to maintenance, repair, replacement of storm water infrastructure, including culverts, are viewed as major issues. ..."to help" ... "communities prepare for the potential local impacts of climate change, with a focus on storm water and flood protection infrastructure."

(http://seagrant.noaa.gov/Portals/0/Documents/what_we_do/climate/documents/NOAA_Sea_Grant_Community_Climate_Adaptation_Initiative.pdf)

EAP participant comments indicated this project has two purposes; one that reflected the academic/researcher group and one that represented the perspective of the local municipality. Participants agreed, for the most part, that the purpose is to adapt to changing climatic conditions. Project conveners viewed this as an opportunity to apply scientific and technical information on the ground. Participants from the city saw the project as an opportunity to get specific information about what their community could do to address the water quality and quantity issues they were experiencing while also considering how conditions might change in the future. Participant comments about the EAP's purpose were consistent; some were brief. For example, one of the project conveners stated:

"The purpose of the project I would say is two-fold. One is from the perspective of community resilience and a changing climate. This is a chance to use scientific information to help our partners in Ellsworth, so it has a place based application related to solutions. Part B is from my own university researcher

standpoint a key focus for us is to really see what are the best ways to pursue our research.”

One participant explained:

“We want to improve our infrastructure for a changing climate.”

Conversely, another participant noted:

“We are trying to convert this knowledge into action.”

Sea Level Adaptation Working Group

The Sea Level Adaptation Working Group (SLAWG) operates:

“to review information from the recent Coastal Hazard Resiliency Tools Project that has analyzed the problem of sea level rise, and then develop an action plan that will set out a road map for how the group will estimate regional vulnerabilities, identify regional objectives to address such vulnerabilities, and provide implementation strategies for regional solutions. “

((<http://www.sacomaine.org/departments/boards/slawg.shtml>)

The purpose of this project was clear – To get four communities (Saco, Old Orchard Beach, Scarborough, and Biddeford), to work together to adapt to sea level rise at the regional scale. The project was based on the idea that sea level rise would affect communities in the Saco Bay area similarly, so a regional approach would be most effective. . All four communities signed an intergovernmental agreement at the onset of the project and

SLAWG participants were aware of the project purpose prior to participating and came on board given the existing project goals. These sample interview responses reflect the consensus and understanding regarding SLAWG's purpose.

"It's about raising awareness about sea level rise. And the implications it would have on the four communities and to look at how we could collaboratively move together forward in some efforts to try to address it and adapt to it."

"The purpose is to really get the four communities in Scarborough old Orchard Beach Saco and something else together to create a regional approach to not only deal with the existing impact they can have but the potential future impacts specifically from sea level rise which is related to climate change but were focused on sea level rise."

"One community on its own can only accomplish so much. By combining our efforts the four communities become a little bit more visible and they make it onto the radar screen of the [state agencies]."

Incentives/Motivations to participate

The second part of the first research question focuses on reasons why people participate in a particular project. The stated or perceived purposes of the projects are significantly related to the reason why participants decided to engage with the group. The reasons why interviewees' participated in a community-based effort to address climate change are inventoried in Table X and discussed below. The Table checks if a reason was expressed by a project participant.

Table 6 - Reasons for Participation: Incentives and Motivations

Incentives	NCHC	PCW	EAP	SLAWG
Opportunity to apply technical information	X		X	
Support student work	X		X	
Live in the area	X			
Interest in learning (for improved decision-making)	X	X	X	X
Possible applicability of outcomes for our community or other communities	X	X	X	X
Enjoy working with the group	X		X	
Concern about the issues/ changing conditions/ how community will be impacted	X	X	X	X
Part of my job	X	X	X	X
To keep an eye out/ protect interests/share my perspective		X		
To address issues in a constructive way		X		
To get support for outreach, engagement and education around the issues			X	
To advocate for climate change			X	X

Project participants had a number of reasons why they were interested in participating initially and why they continued to participate throughout the duration of the project. First I will discuss the reasons expressed in all four projects. I will then provide further detail regarding the reasons expressed in one or two of the projects and I will end with a review of the reasons given specifically by scientists and researchers associated with the groups.

Reasons Common to all Four Projects

Participants in all four projects were motivated by the opportunity to learn. Participants were interested in learning about other people involved in the project and what other groups like them were doing. They wanted to learn about the nature and extent of changing environmental conditions, how they might be affected, and what they might be able to do about it. By doing so, they could make more informed decisions about managing land and other natural resources under changing conditions. Additionally, they wanted to learn about how to respond and take action now. One participant from Neskowin explained that he wanted to expand his understanding of what could be done to address erosion and flooding issues:

"I have a scientific curiosity about what options might be out there."

A participant from Ellsworth pointed out that:

"You can't make a sound decision until you have a clear understanding and inventory of what the issues are."

Participants in all four cases were also motivated by the idea that the work they were engaged in had the capacity to help their community or other communities like theirs. Many participants recognized that their work could be a model for other communities and that these projects offered a unique approach. Several participants felt that they could be effective in their community and others could learn from them. One member of the group in Neskowin noted that their community-based effort could be a model for other coastal communities in Oregon.

“because were kind of a test case and there are other communities that have the problems we have maybe not quite as much but I think that they think that the work with this group will have application up and down the coast.”

A member of the PCW felt that the project could have a positive impact on the community:

“Another incentive is to try and use the partnership to do some larger community building effort.”

A participant from Ellsworth said that she saw the EAP as an opportunity to win something for her community and others:

“If I can have an ordinance that is an example for other small towns to use so they can have meaningful regulation and we are doing things that end up having the impact on the land that we expected then we are all winners.”

All the projects drew participants who were motivated by their concern about the issues. The support for concern came from a number of directions. Some were concerned because they have already experienced impacts related to climate change. Some were concerned because they had been presented with information that showed expected impacts to their area. Some had concerns about environmental impacts while others were more concerned with impacts related to sustainable and livable communities, such as economic, financial, and social, and cultural effects. Others were just generally concerned about their community. One member from the PCW explained that environmental and economic concerns drew them to the group:

"I have concerns about water quality and about environmental preservation and restoration from the standpoint of the natural environment and economics."

A participant from Ellsworth explained that she recognizes conditions in the area are changing:

"The whole coastal band along the state of Maine is getting more rain and significantly over the last 75 years the trends are really different."

A participant in SLAWG explained that their city has already experienced significant impacts and that the public is becoming more concerned about these sea level rise impacts:

"over the past 15 years at least 38 structures have been lost to the sea. We have the worst erosion in the state or the worst consistent erosion in the state is in Saco. Some of the worst flooding in Saco Bay and some of the worst sand problems are in Saco Bay. There are people here saying oh wow this is real, this is tangible, and we are now feeling the effects. It's visual and obvious to people that it's happening."

All four projects included people who participated because doing so was part of their job description or their professional responsibility. Some were asked to participate by their superiors, others volunteered to participate on behalf of their agency or organization. In general, it is important to note that all of the projects had participants who were there in some professional capacity. This participation translated into the group's ability to access financial and information resources through these partners.

A participant in the Neskowin project explained the sense of duty he felt to work with the group:

“the community had a problem, they wanted assistance, and we are their governing body so we need to step up to the plate and provide that assistance to them.”

One of the SLAWG leaders explained that he is responsible for helping these communities protect themselves against future changes:

“as the regional planner really is my responsibility to take some ownership and help with information dissemination and help provide some guidance to the community and talk about ways that they can look to the future to protect their property investments on the seacoast.”

Reasons Unique to One or Two Projects

Interestingly, participants in the two smaller, single communities (Neskowin, Oregon and Ellsworth, Maine) reported that they continue to work together because they like each other. They commented that they have developed relationships with one another that extend outside of the project groups. These projects have created a space where people can learn about one another and develop relationships, thus improving social capital and community capacity. Relationship building was not reported as a motivating factor in the two regional projects. A participant from the Neskowin project explained:

“It has been fun to work with them rather than other groups that are less homogenous in their capacity and dedication and commitment.”

In the Neskowin project participants reported that they were motivated by the fact that they live in the area that may be affected. This is not surprising given that this project was initiated by a number of concerned community stakeholders whose homes and local beach were at risk to coastal flooding and erosion.

One member from the Neskowin group explained:

"I've only got one small house between us and the beach and I've seen the storms... we've seen it's like I think we need to take this a little bit more seriously."

Several participants in the Partnership for Coastal Watersheds explained that they were participating to protect their personal or professional interests, share their point of view, and make sure that their voice is heard in the process. Some also remarked that they were there because they wanted to address complex community issues in a constructive way, and this group had the capacity to support constructive dialogue. The PCW region of southwestern Oregon has a history of conflict especially around natural resource management and land use issues. This was also the most divisive group regarding the science of climate change. It is not surprising that many participants were adamant about championing their position within the group, given the history of conflict, lack of trust for one another, and general uncertainty about the issues they faced, the purpose of the group, and the reasons why they were asked to participate.

One community member from the PCW explained his motivation regarding environmental protection:

“Having a watchful eye of the environmental impact. Society might want to preserve that going forward.”

The lack of trust and uncertainty about the PCW’s purpose caused participants to be wary of the process. As one community member observed:

“Some of them thought it was in the communist plot to environmentally take over the bay area and not allow developments and all of those things.”

Reasons unique to scientists/researchers

One participant from the SLAWG project said that he was participating because the project offered a venue for him to push for action on climate change. Although several participants reported that they were concerned about changing conditions, only two (one from SLAWG and one from EAP) explicitly reported that they were participating to do something about “climate change”.

The SLAWG member who explicitly discussed climate change said:

“there are a lot of naysayers out there who deny the existence of global climate change so I want to be a participant who says yes it really is happening and to make more people aware.”

In the two projects (NSHC and EAP) where university researcher scientists were involved in providing localized data to the group, they stated that they were motivated by the opportunity to apply their information in a real world contexts. Similarly, they were also able to provide their students with real world experiences. Increasingly scientists are

looking for opportunities to apply their science in local communities where their information is valued for its usability.

One of the participants from the Ellsworth Adaptation Project reported:

“A lot of the places I look for funding really are looking for how science gets used by decision makers and this is as perfect of an example of that as I have seen, or one of the best examples”

A scientist associated with the Neskowin project explained:

“I was able to have a master’s student whose work physically got into some of their planning documents”

Decision making and perceived collaboration

The last two sub-questions of Research Question One focused on collaboration and decision making. Making decisions about complex environmental decisions can be difficult.

Participants from each of the projects reported how they made decisions together and to what extent their decisions mattered to the intended goals of the project. Participants also discussed their perceptions of the collaborative nature of the group and offered evidence to support their perceptions.

The table below presents four columns of findings in each of the case study sites. The first column “Decision-making process” reports the type of decision-making process that the group utilized. All of the projects relied on consensus decision-making in some form. All of the groups engaged in dialogue as they sought to make decisions about how to best address

these issues. The second column “Decision authority” presents findings regarding the group’s ability to implement decisions or recommendations developed by the group. None of the groups had the capacity to implement the decisions they made without the approval of another, external, decision-making authority. The third column “Perceived collaboration” is a report of how collaborative participants perceived the group to be. The Neskowin Coastal Hazards Committee members reported a high level of collaboration amongst the group. The two projects in Maine, the Ellsworth Adaptation Project and the SLAWG project members both thought the group was somewhat collaborative but had the ability to be more collaborative. The fourth column “Perceived collaborative attributes” presents the reasons why group members perceived the level of collaboration they did. Mutual or diverse interests, evidence or lack thereof trust and respect, and openness were all cited as reasons.

Table 7 - Dimensions of Decision-Making and Collaboration

	Decision-making Process	Decision authority	Perceived Collaboration	Perceived Collaborative Attributes
NCHC	Consensus – Participants engaged in dialogue about decisions and didn’t move on until all of the members of the group agreed with the decision	Low -Limited to making recommendations to the local community association and the county commissioners	High	-Strong relationships -Mutual respect and trust - Focus on mutually developed project goals - Shared workload

PCW	Phase One – Consensus – ideas were presented by leadership and group members agreed	Low – Limited to providing opinions about what the group may pursue as a goal.	Low	-Group lacks diversity -Lack of trust for each other and leadership -Lack of a discreet purpose - Open to hearing what each other have to say
EAP	Consensus - Iterative – Decisions were made through sharing information with one another and using that to guide the direction of the group.	Medium – subject to approval from city manager	Medium	-Mutual interests though different goals exist -In the process of building relationships -Listen to and respect one another -Working together to identify problems and co-develop solutions.
SLAWG	Consensus – ideas were presented by leaders and committee members agreed	Medium - Decisions subject to individual city council's approval	Medium	-Willing to listen to one another -Each community is unique and has different values, awareness and concern about the issues

The Decision-Making Context

All four of the projects engaged in some form of consensus decision-making. In the

Neskowin project the consensus building process relied heavily of discussion and members

reported that they felt comfortable apposing decisions. NCHC members explained that in cases where they were not all in agreement about moving forward the group would take a step back and ask those who were in opposition to talk about their reasons why and the group addressed their issues until opposing parties agreed. In one case, a participant who did not agree with the direction of the group, decided to withdraw and no longer participate. The Ellsworth Adaptation project was similar in its consensus building approach. Members of the group shared information with one another in an effort to align their interests until they came to a point where they were all in agreement about the decision. Alternatively, in the two regional projects, decision options were presented by leaders of the group and members engaged in discussion about the options. The difference then is that in the two local projects decisions grew out of dialogue and in the two regional projects ideas for decisions were presented and members had the opportunity to engage in dialogue about what would be the best option. In the end all of the projects sought consensus on the decisions before moving ahead.

All of projects were limited in their ability to implement any decisions that they made. For example, in the SLAWG group, although they decided that the increase in freeboard space ordinance was the best option for addressing issues of Sea level rise in the area, each city/town council would have to approve the rule before it could be implemented. Without the involvement or support of all of the town/city council members, only one out of the four communities implemented the rule. Similarly, in the Neskowin Coastal Hazards Committee, they were limited to developing a set of recommendations that they could present to the local Community Association and the County Commissioners. Although they developed the land use ordinances with the help and support from the state Department of

Land Conservation and Development, they did not have the authority to implement their ordinance changes without other decision-making bodies. Having full involvement, or at least the support, of all relevant decision-making authorities is key to actually implementing a decision or enacting the recommendations devised by these groups. Without key decision-makers at the table participants in these groups felt that they were spending a lot of time and putting forth a lot of effort for little to no outcome, other than learning about the issues.

One member in Neskowin highly involved in the land-use planning ordinance creation reported:

“The group has been meeting for three years and we are all agreeing over this and we think it’s a great thing and you ought to adopt it. Well, not necessarily so. The planning commission could say nope and the board can say nope. Some recognize this but they believe that if it’s come from the bottom up and it has all of this support behind it that it is going to sail through. Possibly, but it’s not guaranteed.”

Although SLAWG project members agreed to an intergovernmental agreement to address issues related to Sea level rise, one participant explained that they did not acquire any decision-making authority under that agreement:

“the fact that our group is loosely bound we don’t have any regulatory or statutory or any type of authority to speak of so it’s relatively easy for us to sit around and think about the issues from the regional perspective but a bunch of us need to go back to around us and say okay now how can I translate that information into something that’s tangible for the community.”

Perceived Collaboration

The highest amount of perceived collaboration occurred in the Neskowin group where the purpose of the project was mutually developed and clear among participants. In SLAWG and EAP the project purposes were devised by the leadership and then shared with the group. Participants then agreed to the project purpose when they began participating. This may have hindered the collaborative potential of the group. In the PCW, the purpose of the project was murky, at best. Though attempts were made to help the group co-develop a purpose and goals, the group was hindered by distrust for one another and uncertainty about the issues they faced. The group was unable to identify a purpose that everyone agreed upon and in the end they created sub-groups that recognized the different purposes that people came up with, Thus dividing the group. One member from the PCW explained his perception that having a unified purpose and staying focused on that problem is key to successful collaboration:

“I have only been on a couple of collaborative teams but the most successful ones that I have seen – there was a specific problem that needed solved and we stayed focused on that problem and we didn’t allow the group beyond a certain set of structured guidelines. And here this became a think tank for every social problem in the county.”

Participants reported that their perception of collaboration was influenced by individuals’ openness to explore and discuss new ideas and different options. All four projects had participants who believed that listening actively to one another was a key factor for being

collaborative. Willingness to listen and engage in dialogue about the issues were key attributes associated with the collaborative nature of the groups.

An individual from the SLAWG project reported:

"I think that we are very collaborative in the sense that we are open to listening to each other and hearing each other's viewpoints."

A community member from Neskowin explained:

"We really do listen to each other. We have a very good discussion about the issues and listen to each other's point of view and try to work together to come up with a decision or a recommendation that the majority of the group supports."

Willingness to work together and to share responsibilities for doing the work were also reported as perceived attributes of collaboration. In Neskowin, members reported that work was evenly divided. A community member from Neskowin was quoted saying:

"There's a willingness to do homework like homework as in getting up to speed on something and homework as in get this edited so that I can do the turnaround. I think we've done a really good job of parsing out parts of it."

Conversely, in the Ellsworth Adaptation project and the Sea Level Adaptation Working Group, leaders and conveners did most of the work and then reported their work to the group. In the PCW where members reported a low level of collaboration, participants were hesitant to work together and lacked dedication to the cause.

Roles and Leadership

The second research question addresses the roles participants play and their views of leadership in the project. Specifically:

- a. What roles are present and how do participants contribute in their roles?
- b. What roles are most important?
- c. What roles are missing?
- d. Who are the leaders and why are they perceived that way?

Roles

Through interviews with project participants, a number of roles become apparent.

Participant roles are displayed in Table X. Participants are classified according to the typology of stakeholder roles created by Daniels and Walker (2001). These include:

Participant, advocate, representative, decision-maker, information provider, initiator, sponsor, convener, designer, facilitator, evaluator. Additionally, given the importance of leadership noted in the literature review, leaders are marked with an asterisk. There were two roles identified amongst the stakeholders that are not encompassed by Daniels and Walkers typology. I have named these “connector” and “progressor”. A connector is an individual whose role is to link the collaborative group with other groups. A progressor is an individual who pushes the collaborative effort along, one who seeks to move decision-making forward, or one who continues to push the group toward achieving its goals.

In the interviews, I asked people a number of questions about roles, including “What is your role or roles in this project”, “How do you know what your role is,” “Has your role(s) changed throughout the process,” and “In what ways do you contribute to this project in this role(s).” Each interview participant has been tagged with as many roles as she or he described. Note that all of the participants interviewed were currently involved in the projects and not all of the participants from each project were interviewed. I attempted to identify and interview as many active participants as possible in each of the projects.

Neskowin Coastal Hazards Committee

Table 8 - Neskowin Coastal Hazards Committee Roles

NCHC	NP#1 – Information Provider
	NP#2 – Facilitator
	*NP#3 – Leader, Sponsor, Decision-maker
	NP#4 – Information provider, Representative
	NP#5 – Information provider, sponsor
	*NP#6 – sub-leader, Designer, Initiator, Progressor
	*NP#7 – Sub-leader, representative, Initiator, Connector
	NP#8 – Participant
	*NP#9 –sub leader, Information provider, Connector, Progressor
	NP#10 – Participant, Information Provider, Connector
	NP#11 – Participant, Connector

Participants in the NCHC enact a variety of roles. Participants see the group as being “flat” and identified a number of leaders from state agencies, the county commission, and local citizens. Stakeholder leadership is shared amongst members of this group, though participants reported that there is one primary leader. This leader explained:

“I provide overall leadership , providing guidance, keeping things on track, using the power position, when you’ve got the county commissioners the chair of the board of county commissioners it carries a certain amount of power and weight to the position that people will listen to.”

Interestingly almost all of the NCHC members reported having more than one role. Many of the members share responsibilities of doing work, connecting with outsiders and finding and sharing information. The technical information providers are somewhat external to the group. Members of this committee have significant scientific and technical information themselves. Many of them have held positions in scientific, technical and academic fields. When additional technical information was needed they sought external sources.

One active member in the NCHC described his work related to the group:

“Setting up meetings, having the meetings, organizing, leading the group, and deciding what’s important and what isn’t making recommendations, and reporting out to this group, and then writing reports, and making presentations to the community.”

Also it is interesting to note that a number of the project participants from the local community are retired. Many of the people on the NCHC have dedicated significant time and energy to this project. Other than those from the state agencies and county commission, participants are not paid to be there. Rather, many of them decided to participate out of concern for their community and the issues their community faces.

I identified four connectors and two progressors within the group. The progressors have pushed the group to the point of implementation and have been key to keeping the group focused on developing outcomes based on their goals. The connectors are also key because they have been able to bridge their respective organizations with the NCHC. In a way the group has people on the inside of organizations that are key to implementation. For example one of the NCHC members is also a member of the county land-use planning committee, the organization with the authority to pass or deny the land use ordinances that the NCHC has developed.

Partnership for Coastal Watersheds

Table 9 - The Partnership for Coastal Watersheds Roles

PCW	PC#1 –Advocate, Progressor
	PC#2 – Information provider
	PC#3 – Advocate

	PC#4 – Advocate, Representative
	PC#5 – Information provider, Representative
	*PC#6 – Leader, Convener, Initiator, Information provider, Designer, Progressor
	*PC#7 – Leader, convener, Information Provider, Progressor
	PC#8 – Advocate, Representative, Progressor
	*PC#9 - Leader, facilitator
	PC#10 – Participant, Connector
	PC#11 – Participant, Information Provider
	PC#12 – Representative, Information Provider

Members of the PCW, other than the leadership, were mostly either active advocates for a particular issue or outcome, passive participants who were involved to observe the process, or representatives from state or local agencies or groups.

One member from the group stated:

“I don’t think that I’ve been asked to contribute other than physically being there and offering my opinion.”

More than half of the people who attended the first few meetings were no longer participating at the end of Phase One of the project. Interviewees reported that several of those participants were advocates for particular economic or environmental interests and that those individuals decided not to participate because the group did not pose a threat to their particular interest. Some members felt that they provided information support to the group, though some felt that they had more information and resources to share and that they did not have the opportunity to contribute as much as they hoped.

One member who was highly critical of the group stated:

“I’ve been critical of the whole thing since day one. I mean what the hell are we doing? What is it that you want me to contribute to? I am a resource? I’m speaking both

individually and as a representative of a larger group of people. I am a resource, so tell me what you want me to do, to provide for this project, so that I can help you accomplish what your objectives are.

This quote also relates to the finding that some of the members expressed confusion about what their role was and doubted that they had any meaningful role in the project. Despite their interest in participating, they had little to no contribution to the project outcomes.

The majority of the members were selected and invited to participate by the project leadership, but some felt that their participation basically just ticked a box on an inventory list of who should be involved. Note the number of roles described by one of the leaders (Leader, Convener, Initiator, Information provider, Designer, Progressor). Project leaders reported that they struggled to distribute leadership roles throughout the group. Most of the people who were still participating toward the end were paid to be there as part of the jobs or professional affiliations. Few were not paid for their time and were volunteering their time to participate.

Ellsworth Adaptation Project

Table 10 - Ellsworth Adaptation Project Roles

EAP	EP#1 – Facilitator, Progressor, Information Provider
	EP#2 – Information Provider, Decision-maker
	EP#3 – Information provider
	EP#4 – Participant
	EP#5 – Participant, Connector
	*EP#6 – Leader, Convener, Facilitator, Connector, Progressor
	EP#7 – Decision-maker
	*EP#8 – Leader, Information Provider

All of the participants in the EAP are actively engaged. The two project co-Principal Investigators (PIs) are considered the leaders, however the land use planner from the city is also considered a key player, given her active participation and decision-making authority. Others on the project are participating in support roles and have tasks associated with their roles (information gathering, sharing, data analysis, etc.) Participants who are project progressors have been key to moving the project along; they also act as facilitators or brokers between municipal officials and the university scientists.

One of the project facilitators/progressors explained:

“My objective is to coordinate that information that he is working on with community officials to see what information would be useful for coming up with a long term plan about managing culverts and storm water in a changing climate. So I am kind of like the middle person between the biophysical and the end user.”

The two project co-PIs had envisioned a project like this. They procured funding to support it, but needed the right community to work with. When the planner from Ellsworth showed interest in what the researchers were trying to do, the project began to form.

Project conveners hope to involve a broader range of stakeholders once the project has established itself a bit further. Note that all of the project participants are working on time paid either through monies procured through the grant or money distributed through county or local municipal budgets for staff time.

Sea Level Adaptation Working Group

Table 11 - Sea Level Adaptation Working Group Roles

SLAWG	*SP#1 – Representative, sub-leader, Progressor, Connector
	*SP#2 – Information provider, leader, convener, progressor
	*SP#3 – Leader, Information provider, Connector
	SP#4 – Representative, Information provider
	SP#5 – Representative, Information provider
	SP#6 – Representative Information provider
	*SP#7 – Former leader, Convener, information provider
	SP#8 – Representative Information provider

The conveners and leaders of the group re responsible for pushing the group along.

Leaders from the Southern Maine Regional Planning Commission and the Maine Geological Survey convened the project out of concern and the sense of responsibility they felt to do something to address issues related to Sea level rise in the region. The town planner for the community that has experienced the most loss related to Sea level rise has emerged as a key leader in the group, as well.

He explained his role in stating:

"I like to think that I done something to keep the group focused. And I think that's part of the urgency that I have. These meetings are often fun there are good folks were on the committee but I think staying task oriented so that we continue to progress is vitally important."

Other town planners have continued to attend meetings. They provide information and listen to presentations, though they report being less engaged now that they were unable to pass the freeboard ordinance rule in their respective communities. Initially, all of the planners were all asked participate and to invite a local community member under the

intergovernmental agreement signed at the onset of the project. All, except the community members at large, are paid for their time for this project.

The initial project conveners have since formed a consulting practice based on their work in this area, therefore one of the conveners stepped down from the leadership role at the time their initial five year funding was running out. A new leader replaced this individual and was in the process of redefining his role as the project moved forward. The new leader is charged with finding additional funding and devising a new direction for the group, given the failure of the ordinance decision in three out of the four communities.

Important Roles

Facilitator

Participants reported that there were a number of roles that were important to the group's work. In all four of the projects the intermediary/facilitator role was invaluable.

Interviewees remarked that facilitators had a broad knowledge of the issues and an ability to synthesize technical information in a meaningful way for the community. The facilitator also has an organizational role of taking notes, planning meetings, inviting participants etc. This function was important because having an organizational person kept the group on track and kept people up-to-speed. Participants also noted that they didn't want the job of organizing the meetings etc. It seemed to be a less desirable job for many. Facilitators were also valued for their ability to moderate conversation when disagreements occur, keep lines of communication open between the groups and external organizations and parties.

Leader

According to interview participants, the leadership role was also very important. Leaders pushed the project forward. Participants felt that the leaders legitimized the group to the broader local and county community, and helped the group stay dedicated to the project mission and goals. In both SLAWG and the PCW leaders were also the conveners. They stated that they didn't necessarily want to be the leaders, but they struggled to find ways to transfer leadership to the membership. Leaders and leadership characteristics are discussed in more detail later in this section.

Information Provider

Interviewees identified the information provider as a third important role. All of the groups engaged in a learning process where they sought information related to their project's purpose and group work. Participants were interested in getting information specific to their community and the different information providers were able to address these needs. Information providers contributed technical, scientific, engineering, land-use, local community, and historical knowledge.

The type of information valued varied by case study site and is discussed in more detail in the Knowledge and Learning section of this report. In general, groups have relied heavily on and valued greatly the scientific and technical information providers, though they recognized a need for aligning technical information with local perspectives.

Connector

The connectors were also valued within these groups. Connectors constructed bridges with other decision-making groups, external stakeholders, and the broader community. The Neskowin group was the most dedicated to keeping the wider community informed about what it was doing to maintain transparency and the reasons for decisions or recommendations. Ellsworth participants explained that they were in the early stages of communicating more broadly with the community and that doing so was an important facet of their work. In the PCW and SLAWG, participants were invited based on their affiliations with other individuals and groups (i.e.: municipal authorities, tribes, economic development boards, environmental agencies, etc.) In some cases these connections were strong, while in other cases the connections were weak. For example, in the SLAWG project one of the town planners maintained a strong relationship with his town manager and town council, while the other three planners were not as dedicated to communicating about their SLAWG work with decision-making authorities in their communities . In the end, those three towns did not pass the proposed ordinance.

Decision-maker

Decision-makers had key roles in the projects. Participants reported that having political leaders involved was important because these leaders had the power to influence other with decision authority to implementation decisions made within the groups. None of these groups had the capacity to implement their work on their own. They all relied on parties external to their process to pass, support, or fund the implementation of their planning efforts. Consequently, these groups have struggled to get action done in relation to their work. Decision-making of this kind is often done by a community of voters.

Members of the Neskowin and Ellsworth projects recognized this early on and have tried to tie in the broader public, as previously discussed. Members of the PCW and SLAWG recognized later in the process that communicating with the broader public would have benefitted their work in some way.

Other Roles

Participants in Neskowin reported that having a dedicated, motivated, educated group of members who are willing to do the work was also vital. Members served as initiators, information providers, and designers. They were actively involved in the development of the group, its mission, and strategy for pursuing the mission. I also found evidence of a shared workload in the Ellsworth project. Interestingly, however, in both of the regional projects the majority of the work was done by the project leaders and conveners. As noted earlier the leaders in these projects also reported that they didn't want to be the leaders. Parsing out leadership responsibilities and giving participants an opportunity to do more of the "work", creates more of a distribution of labor to a broader sect of participants.

Participants in the PCW expressed that they felt broad representation and diverse stakeholder participation were key. Although the project drew diverse participation early on, the group slowly dwindled and became more homogenous. Many interviewees believed that keeping the group balanced in terms of economic and ecological interests was important. They also believed that having participants with different kinds of information (i.e.: the tribal perspective) was also important. Similarly, in the Neskowin project, participation early on was more diverse, but as the group formed it became more

homogenous as members stopped participating. In Maine, the SLAWG project had basically the same participants all along and they all signed a formal agreement dedicating their participation through the five year duration of the project. The Ellsworth Adaptation Project has maintained the same group all along but plans to bring in other stakeholders later, on a need basis. These groups then, represent three different approaches to involving stakeholders. One - involve as many stakeholders early on and let them decide if the project is worth their while. Two - invite a set of stakeholders and have them formally agree to the project such that they are bound to participate to the end. And three - start with a core group of stakeholders and roll in other relevant stakeholders as the project progresses and as there is a need for additional participation.

Roles missing

In all four projects, participants made note of roles that were missing. Participants in Neskowin and especially in the PCW reported a need for greater diversity amongst the stakeholders. Participants felt that having more dissenting opinions or ideas that were “outside the box” would be beneficial for the group’s work. Some thought that having participation from fishers, beachcombers, property owners, business owners, environmental organizations, decision-makers/political officials might diversify the group and provide a broader perspective on the issues. Some participants believed that the more diverse participants there are at the table, the more difficult it is to work together and get something accomplished.

Participants also reported the need for individuals who specialized in the procurement of funding/grant writing and public relations/external communication. The Neskowin project was able to procure some funding but they still needed to raise money to implement the engineering options that were devised. Similarly, SLAWG project members recognized a need for help in finding long term funding, especially as their five year initial seed funding was expiring. The PCW and EAP projects were all funded through grants that participants felt were sufficient for the scope of the work.

The two regional projects, the PCW and SLAWG reported a need for communication support, especially with their broader publics. The two local projects had more capacity to communicate to their publics, given that they were considering smaller audiences than the two regional projects and they had members who are skilled communicators. The regional projects however, affect large and diverse publics with varying levels of concern for the issues and social, economic, and ecological values, thus making broad communication for these groups difficult and important.

Lastly, all of the needed more participants who had the capacity to implement the groups' decisions. Participants commented that having those with decision-making authority and political power was essential to actually accomplishing the group's goals. Without it the groups risk doing a lot of work for little outcome.

Leadership

As noted in the discussion of roles, the leadership position is central to the work of the group. Case study participants have been asked to consider a number of leadership issues,

including who they regard as leaders and why, what characteristics they associate with leadership, and how the project or group determines its leaders.

Neskowin Coastal Hazards Committee

This project has two levels of leadership. The primary leader is a political official who is a decision-maker. Community members and project conveners are also considered leaders. Several members consider the group “flat” and note that the members share the responsibilities of the group’s work.

The primary leader of this group was asked to participate by members of the community who initiated the effort. Members of the NCHC identified the county commissioner as a leader because they felt that he added credibility and authority to the group. The Commissioner focused on a practical outcome that would be beneficial to the community, and he was positive and committed to helping the group achieve something of value. This leader took a more facilitative approach to leading the group by respecting project participants’ opinions and providing the opportunity for concerns and opinions to be heard. He is also the one who pushes the group to keep moving forward toward their goals.

Community members as leaders exhibited a number of characteristics. They were willing to do the work, had the time to do so, and were knowledgeable and experienced in different ways. They were also concerned about the issues and maintain deep connections with other organizations and with the broader community.

Partnership for Coastal Watersheds

The three representatives from the two organizations that accessed the grant money for the PCW project (the Coos Watershed Association and the South Slough National Estuarine Research Reserve) were seen as the primary leaders. They were viewed this way because they proposed the project and got the money to do it. Several participants had significant distrust for the project leadership. Some thought that they had hidden agendas. Some participants thought that the two convening organizations may have not agreed about the purpose or goals of the project. Although the leaders saw themselves as more facilitative in their approach, participants saw them as more of a command and control style of leadership. As discussed previously the leaders also pointed out that they didn't want to be the leaders and that they had a hard time transferring leadership to other members in the group.

Toward the end of Phase One of the PCW project two participants, one from the local economic development board and one from the local tribal community, emerged as leaders moving forward. This is primarily the result of Phase two being a product of their ideas and direction. Some felt that the direction of Phase Two was subject to whoever had the loudest voice about what should be done next. Ultimately, the Phase two leaders were those who had the time and interest to continue the project forward.

Ellsworth Adaptation Project

The two project Principal Investigators (PIs) were considered the leaders of the project. One PI brought expertise from the scientific and technical realm and the other brought expertise from the social realm. The group also regarded the local city planner as one of the leaders. Participants saw the two co-PIs as leaders because they have conceived the project

and have expertise and knowledge to do the work. EAP participants viewed the city planner as a leader because she has local information that is valuable and she has relevant decision-making authority. Additionally, she had an ally in the city manager who supported her work in this area. She was also very knowledgeable about her community, its needs, and the issues community members perceive.

This project was also quite flat in terms of leadership. The three leaders each represent an area of expertise (social, technical, and local). Each leader has one or two associates who also represent pertinent areas of expertise. Participants all have roles and responsibilities and share them equally.

Sea Level Adaptation Working Group

Like the Neskowin group, SLAWG leadership occurred on two levels. There are the two project conveners from the regional planning commission and geological survey and a leader that emerged from the four town/city planners involved in the project. The conveners were viewed as the leaders because they did the work and they had knowledge and expertise to contribute. Furthermore, the conveners as leaders have secured funding and have provided organizing and staffing resources. The town planner is seen as a leader because he is the most affected, he is very vocal and he has more political support and the ability to affect decisions. This town planner has pushed the group forward and has been the most dedicated to getting results from the group's work.

Leadership Summary

The two local projects (Neskowin and Ellsworth) are “flatter” in terms of leadership, whereas the two regional projects (PCW and SLAWG) have a more hierarchical leadership structure. One participant from Ellsworth reported:

“I would say I am the project lead. But I mean there is nobody that is the leader you know “the leader” I would say that we have different components of leadership in the project.”

Leaders are characterized by their ability to procure funding and receive financial support for their work, the technical and local expertise they brought to the groups, as well as their facilitative, organizational, and social skills. Additionally participants felt that the leaders simply have a passion and dedication for the issues.

Leaders in the two regional projects, the PCW and SLAWG, explained that they tried to distribute leadership to other members of the group but they struggled to do so. One leader from the SLAWG project explained:

“I’m the leader even though I try not to be. I literally just try to be the technical advisor and sort of bring the science and stuff to the people but I’ve worked with so many communities know that there’s a lot of lessons that I sat through that I can bring to the group. But I try for its not be so much of a leadership role as much as it’s so here’s what happened in this place trying to be more of an informational source.”

In Neskowin and Ellsworth, the sharing of leadership was achieved by distributing responsibilities and work load, thus giving the groups a “flatter” appearance. The two

regional projects were not as effective in dispersing the work load and the majority of the work was done by those in the leadership positions.

Participants in Neskowin, Ellsworth, and SLAWG had a great deal of respect for project leadership. In the PCW, however, some participants respected the leadership while others were highly distrustful and skeptical of the leadership. Leaders are the glue of these groups. So, in the PCW where there was less respect for the leaders, the group did not commit to the project in the same way they did in the other three projects.

One PCW member explained:

"The actual leadership was more agenda driven and I don't think the rest of us really knew what the agenda was."

Leaders brought different types of expertise and knowledge to the projects including: how to get resources needed to support the group's work, technical and scientific data and expertise, knowledge of local and regional policies and politics, and knowledge about how to work with people. Leaders were also valued for their communication skills. Participants in Neskowin and Ellsworth reported that their primary leaders know how to facilitate dialogue and engage with stakeholders. Project leaders in SLAWG and the PCW were valued for their ability to organize the meetings and get people to participate.

Leaders also care deeply about the outcomes of these projects, and so they are passionate and dedicated participants. All of the progressors identified are also leaders. Participants valued leaders' ability to push the group forward and keep it going. Participants also appreciated having one or more person who had the energy and drive to lead the group.

Knowledge and Learning

The third research question in this exploratory study highlights knowledge, information, and learning. More precisely:

- a. What knowledge and information is valued?
- b. What information was needed to fulfill the purpose of the group?
- c. What did participants learn?
- d. How is knowledge and information shared?

Knowledge and Information Valued

Overall, participants in the four projects valued both scientific/technical knowledge and local/traditional/experiential (referred to herein as “local knowledge”). As discussed in the review of literature, scientific and technical information is characterized by the use of the scientific method to determine what is real or true. The latter, local, indigenous, or traditional ecological knowledge is derived from personal observations and experiences, and is often a cumulative interpretation based on cultural history (Berkes, 1999; Dukes, et al., 2011). All of the projects relied heavily on scientific/technological components, given that they were focused on addressing complex scientific issues related to climate change, including sea level rise, flooding and erosion patterns, changes to heavy rain events and the overall changing of biophysical conditions in watershed and estuarine habitats.

Participants in each project also reported that the group featured local knowledge as well, in many cases stating that the scientific and technical information supported what was already being experienced in the community. One of the leaders from the Ellsworth Project explained:

The local knowledge was regarded highly for its ability to ground truth scientific and technical findings. In the end, participants believed that you need both types of information.

Each project, however, placed varying degrees of value on the types of information and had different reasons why.

The Neskowin group emphasized the scientific and technological knowledge more so than the local, traditional and experiential though it recognized a need to have a space where local information could be shared. The majority of this group was comprised of people who come from scientific or technological fields. Several members are retired engineers, scientists, and academic professionals. Participants emphasized how educated group members are, associating their level of education with the emphasis they placed on scientific and technical information. They valued local knowledge, as well, given their community based approach and local community member involvement in the project. The Sea Grant representative participating in the Neskowin project explained:

“people have lived there a long time ...a lot of local knowledge went into helping to craft where we’re going. So I would say it was one of the factors besides the science. See you have to put them together, local knowledge with the science and the expertise from different people.”

Members of the NCHC reported that they recognized the need to let people with local knowledge express their concerns in order to create a product or outcome that would be amenable to the community. They wouldn’t have been able to do that if they weren’t willing to listen to what the broader community thought about the issues. Members felt that they needed to value both scientific and local knowledge to be effective. A small minority of members dismissed local knowledge and referred to it as “anecdotal” “bullshit”, “hearsay”, and “gossip”. Conversely, another member stated that he believed that local knowledge is

not valued enough by scientists and that there should be more emphasis on having scientists spend time in nature so that they can obtain local knowledge.

In the Partnership for Coastal Watersheds local knowledge was valued highly by the majority of group members. While the leadership and agency officials reported a higher regard for scientific information. This group was divided by those who put stake in one more than the other. Members reported that they were skeptical of the science and that the group had to be careful what they called “science”, noting that sometimes information is called scientific when it isn’t.

One of the PCW group leaders explained to me that he saw the need for getting everyone in the group to agree on the science and facts, because in the past, arguments over what is factual and what is not has been a source of conflict. This community has had a history of conflict over what is valid in terms of the science that has been presented to support either economic or environmental interests. Some felt that science has been used to support positions and that it can be manipulated so that it favors one side or the other. One community member from the PCW reported:

“The scientific is always interesting to me. But I look at it through skeptical eyes, because if you are the scientists and you want to find something that takes the view of that scientific outcome, you’re going to do it.”

Interestingly, in the PCW, one of the leaders, from the National Estuarine Research Reserve is more technical science oriented and the other leaders, from the Coos Watershed Association, are more local knowledge oriented. This may be why some felt that there was a disconnect between the two leadership groups. Although the leadership group was

comprised of individuals who value local and technical knowledge, and there was a large contingent of participants who place a high value on the local knowledge, the majority of the data collected and presented to the groups was technical information.

In contrast, the Ellsworth Adaptation Project also maintained leaders who are more technical science oriented, and those who are more focused on the value of local knowledge. When this project was convened the leaders wanted to explore ways to align different types of information and knowledge so as to be more effective in place-based adaptation. Consequently, they have been effective at integrating different types of knowledge into the work of the group. One of the Ellsworth Project leaders explained:

“We see it in phases - where we engage and really focus on what the local contexts are and then we go back and talk about what we are learning from the data, and then we either update the kinds of concerns or make changes and say we should focus on this.”

Participants in Ellsworth feel that both the local knowledge and scientific knowledge are equally important. The project approach to adapting to changing climatic conditions was to align these different kinds of knowledge and for the members to teach each other about what they “know”. By valuing and presenting both the scientific and local knowledge, connections are made between what people are experiencing and seeing first hand and what they are seeing on a graph. One city official pointed out that it is difficult to substantiate policy decisions based on local knowledge alone. Members of this project feel that they need both local and scientific information to be able to support the reasons why they are making policy decisions and have the policy decisions accepted by the broader community. A participant in Ellsworth stated:

“We definitely all recognize the value of local and traditional knowledge. It is very valuable in knowing what happens every year, what places have the same problems, how the weather changes. But there is definitely a respect for the actual data and hearing from a professor, seeing a graph or some kind of representation that you have to struggle to understand. We think those people know something they are working with the data and numbers, having them explain it, you need that, I think everybody knows that you need that hard science to back up what people are saying. You can’t justify, especially the city, ordinances saying well you need to design for this unless you have...well you can say it but people are going to question you. And if you can say this is the data, then they understand.”

Like the other groups, the Sea Level Adaptation Working Group valued both scientific and local knowledge. The group relied on scientific data to support their claims that something needs to be done to address the issues. They used technical science to substantiate the reasons why they are doing this work and why they believe the towns should pay attention to sea level rise as an issue. However, they recognized that the local knowledge that participants were able to share was invaluable for developing an understanding of the politics in each of the cities/towns, and the way people in the broader public perceive the issues they are grappling with. Additionally, local knowledge was useful to the group because it helped them “ground truth” what the vulnerability assessment scientific findings showed. In the process of developing the vulnerability assessment, group leaders found

that they could really use more local information. So they decided to work with public works officials to help them be more accurate in their mapping of vulnerable areas. One of the leaders from SLAWG explained:

“we started to engage our Public Works directors as we were developing our vulnerability assessment. We did a lot of so here’s this and this is what it shows, these are the parts that we’re interested in, is there anything we’re not picking up on? So then we would try to understand where mapping wasn’t picking that up and then we would incorporate it back into the map.”

Information Needs

Participants in all four projects noted the importance of obtaining information in order to achieve their project’s purpose. They needed scientific and technical information as well as information about the communities. On the scientific side, they needed data about what was happening, how they might be impacted and what might happen in the future. They wanted to answer questions like: How much? How high? When? And for How long? And

How many people and What structures will be affected? A participant from Ellsworth stated:

“We have to understand about the watershed. What is the status of the conveyance structures, how much rain? how much water is already being funneled? how much capacity is there? how many people are at risk?”

Participants also reported that they needed data specific to their community or region. All four cases involved location specific data collection, including inventories, maps and models that depict possible future conditions. One PCW leader, the representative from the South Slough National Estuarine Research Reserve, collected data about the current conditions of the watershed. Another PCW leader, the representative from the Coos Watershed Association, sought out socio-economic data about the area. The Neskowin project hired a consultant to identify engineering options. They also worked with scientists from Oregon State University (OSU) and the Oregon Department of Geologic and Mineral Industries (DOGAMI) to better understand future flooding and erosion trends. The SLAWG project leader from the Maine Geologic survey led the development of a regional vulnerability assessment. In Ellsworth, they were installed and collected data from rainfall gauges. The graduate student associated with the project also created a culvert inventory as part of his thesis project. A project convener from Neskowin discussed three information areas that required their attention:

“Well there are three. One is what is going to happen to the shoreline and that has not been satisfied. We have given ranges and that has been slightly satisfying, but it is unknowable, so that is too bad. [Two] They have identified all of the active protective

structures that exist on the planet and they have listed those and organized those according to the applicability to Neskowin. They have done the same thing with land use regulations. Shaking the tree, what is out there, what would work here. Third, we wanted to know what do other communities do with regard to land use and physical structures and active protection and that stuff."

Members from the two local projects reported that when they started out they wanted to find out what other people were doing in similar situations, and identify what worked for others and what didn't. One participant in Ellsworth explained that he is constantly looking for new and relevant case studies. Interestingly, the two regional projects did not report an emphasis on identifying what others were doing as much as the two local communities of Neskowin and Ellsworth. This may be because regional approaches to climate adaptation in the U.S. were still fairly nascent at the time.

With regard to better understanding their communities, participants reported interests in gaining a better understanding of the politics and policies unique to their community or region. All of the groups needed to learn, especially related to land-use, how decisions were made and on what basis. They also needed to know the ways in which they could influence this process. The two groups in Oregon reported a need for understanding the history of their communities and how historical events have shaped the issues in present day.

Participants in the two Oregon projects (NCHC and PCW) also reported that early on they needed to figure out what their purpose was as a group. One member from the PCW explained:

"I think in the beginning the need of the group was that everybody just wasn't quite sure why they were there. There was a lot of why are we here? And why do we need to do this? what is the point?"

The Neskowin project was effective at fulfilling this need by discussing their individual concerns and then taking the time to craft a purpose statement that was inclusive of the different interests represented within the group. Conversely, the PCW, at the end of Phase One, several participants were still unclear about the purpose of the project and expressed a desire to identify a discreet goal that could foster the continuation of the group.

Learned

All of the projects had to undergo a learning process in order to achieve their goals. Participants all went through an understanding phase where they tried to get a better picture of what the issues are in their community, how urgent they are, and how much they might be affected by them. Then they needed to better understand what they could do, and what was in their capacity, to address the issues. In all of the communities, to some extent, there was also an attempt to understand why they were experiencing their issues. This meant that participants learned a great deal of information about bio-physical processes, especially those related to coastal, estuarine, and marine ecosystems in addition to some climate science. Several participants noted that they learned a lot about the science, and their communities but they also learned how to work with one another. Participants reported that they honed their communication skills, especially their listening skills.

Additionally, participants learned that these groups can provide a space for participants to share information and learn from one another. A participant from Ellsworth noted:

“I think that we have learned how to work together, how to bring people in and include them. We have learned how to listen to each other, which is super valuable.”

Participants in the two local projects (Neskowin and Ellsworth) reported that they learned that they could function well as a group and get work done if they were willing to work together. They also discovered the importance of including people who were dedicated to the issues and willing to do the work necessary to address them. Neskowin participants also reported that they learned that retirees were excellent participants and that having a leader with some political authority could help a small community. Similarly in Ellsworth, participants recognized the value of having a leader with decision-making authority and a team of people to take on different tasks.

Participants in the two regional projects (PCW and SLAWG) learned that engaging diverse stakeholders from different areas at the regional scale is difficult. One of the leaders from SLAWG stated:

“it’s not an easy process to work through and that it takes a long time. We took this as a regional approach and I can’t say that we’ve gotten a regional adaptation strategy we haven’t. It’s easier to move forward with one community who wants to do something and I think the group has realized that.”

The lack of decision-space, and the diversity of stakeholders in terms of their interests and values made the work of these larger scale projects more difficult. Additionally, participants from SLAWG felt that unless people are directly impacted in some way, they

aren't interested taking action. The Neskowin and Ellsworth projects were centered on issues that were visible, tangible and recently experienced by the community. The regional projects struggled with demonstrating the importance of doing something now because only parts of the region had been impacted.

Lastly, participants in each of the projects reported that they learned about how difficult adaptation work can be. Some reported that it takes time, that it is slow, and that rushing it doesn't work. Others commented that the issues are complex and people are complex and the complexity makes this work difficult. In the end, participants learned that being dedicated to this work is necessary because this work requires patience and a willingness to learn.

Sharing Knowledge and Information

Neskowin group members really saw themselves as a learning community. They set out to learn what they needed to and share information with one another. Neskowin participants relied on scientists for detailed information about coastal erosion and flooding hazards related to their community. However, much of what they learned came from their own members. Participants were encouraged and expected to learn about what was important, interesting, or relevant to them and then share it with the group. The information and data that were collected along with meeting notes were housed in an online database called Basecamp (<https://basecamp.com/>). Participants were able to access and upload relevant information any time and the site served as a central location where people could go to learn and obtain information.

The Neskowin group was also the most dedicated (out of the four case studies) to communicating with the broader community about what they were doing and why. The group was also interested in getting feedback from the broader community about their work. Some communication occurred via formal presentations with question and answer sessions, while much of the communication was informal and involved people talking to their friends and neighbors about the group's activities. One of the group members identified texts that the community might be interested in reading and procured a special section of the local community library for information related to the project.

Partnership for Coastal Watersheds participants felt that there was a lot of information shared within the group, but not a lot of effort to have the group do something with the information they had. Formal presentations were given by the leadership, state agency officials, and a member from the Coquille tribe. Meetings were designed and facilitated so that participants would be able to contribute to large group discussions in addition to participating in smaller break-out groups. Participants reported that they appreciated the smaller group work because they felt more comfortable speaking up. The majority of individuals reported that they felt they were there to listen and learn more than they were there to contribute their own knowledge or information.

The process of sharing information and learning has been iterative in Ellsworth and the project was designed to be that way. They were focused on learning from each other so they could align their knowledge and efforts. Participants explained that their information sharing and learning was about connecting the scientific and technical data with individuals' experiences. Participants felt that they are learning from one another by

sharing information and then incorporating that information into their work. Much of this information sharing took place in informal meetings. Participants noted that building relationships amongst the group is a key aspect of being able to be so reflexive in their approach. Also, having Maine Sea Grant staff as a broker between the technical scientists and the municipal officials was important.

The Sea Level Adaptation Working Group engaged in a lot of learning and information sharing. However, due to the make-up of the group there was very little they could do to implement the plans they devised from this process. The group recognized the need to share more information and communicate more with broader publics outside the group. The scientific and technical information about sea level rise was shared through presentations by project leaders and other experts, while information about the community politics and policies etc. was shared by planners and representatives from the communities. Much of this information sharing took place during the monthly meetings that occurred over the five years that the group has been active. Much of the information presented and discussed in the meetings supported the development of a vulnerability assessment that could be shared with the broader community and substantiate the need for planning within each of the communities.

Climate Change

The fourth and last research question in this study considers the ways in which “climate change” factors into the work of the group.

- a. What climate change issues are being addressed?
- b. How is climate change talked about?
- c. How is climate change information used?
- d. What are their sources of climate change information?

Issues Addressed

Each of the projects focused on specific impacts related to climate change. Participants from the NCHC and SLAWG designated clearly the issues their projects addressed. Given its infancy, the EAP has been identifying possible issues, and after preliminary discussions they have begun to address storm water issues. PCW members cited a number of issues that the project addressed. Issues related to climate change were overshadowed primarily by economic concerns and other social issues of interest. But project issues were vague, likely stemming from the overall lack of clarity regarding the project purpose and the reasons why the group was convened in the first place.

Table 12 - Climate Change Issues being addressed in each community

Project	Findings
NCHC	Increased severity and impacts of storms Coastal erosion
PCW	Sea level rise Land use planning Economic development Estuarine management Erosion Invasive species Habitat restoration
EAP	Extreme rainfall and storm events Culvert management/ impact on infrastructure
SLAWG	Sea level rise Storm surge/flooding

Participants in each case study were asked about how they talk about climate change and they were careful in explaining how they used climate science in their work. Most participants reported that climate change was the impetus for their projects but they what they are doing is not about “climate change”. It is about the specific impacts they have

identified in their communities, like Sea level rise, erosion, and flooding. An individual from Ellsworth explained:

“Climate change is what’s why we are here that is why we are talking about this. Those information that we will get, we know that we are having larger rain events and now we need to understand how to deal with it and how to manage it, and how to be proactive around it.”

Talked about

I also found that most of the people participating in these projects believe that climate change is a real issue but they are hesitant to talk about “climate change”, especially with people external to the group. One participant from SLAWG reported:

“Climate change is certainly part of the equation but it’s not part of our discussion.”

Interestingly, there were a few participants who explained that they don’t believe climate change is happening, though they are actively participating in the projects. Participants cited a number of reasons why they felt that focusing on their specific community issues rather than climate change was beneficial. They explained that climate change is controversial, that it is too complex and abstract, and that they as local communities can’t do anything about it, but they can do something about the specific issues they are addressing. Also, participants reported that people in coastal, beachside communities don’t want to hear about doom and gloom. When they come out to the beach, they want to escape their worries and relax. The planner from Ellsworth pointed out that climate change is too “fatalistic” for people:

“Climate change is not ah have the sex appeal. You know? I think that it could be seen as fatalistic and doom and gloom. I think that people in the state of Maine in this area would rather talk about things that they can grasp and understand.... It is not the best way to get people on the same page to start.

Even though all four projects were developed to, in essence, adapt to climate change, there was minimal discussion about “climate change” or “adapting”. Participant are talking about “preparing for” or “addressing” or “raising awareness of”, “changes”, “hazards”, “expected impacts”, “environmental conditions” etc. When asked about the purpose of the SLAWG project the majority of respondents talked about taking a regional approach to dealing with the effects of sea level rise. In the end the purpose seemed to be as much about the process of working together as it was about the substantive climate change issues. Similarly, in Ellsworth participants explained that the project was about co-developing solutions and learning from one another. Project participants discussed the process oriented attributes of the project as much as the substantive issues. Also, in the PCW, though participants were hazy about the purpose of the project several noted that it was in part to get people to work together. Again, focus was on the procedural elements as well as the substantive.

Conversely, Neskowin was focused more on substantive issues of concern and was less interested in the process of how to address their issues. Though, in the end, I think that they realized that their community-based process was one that could provide insight for other communities like them.

In all four projects people recognize the importance of climate change and feel that it is woven into the fabric of their work, but they want to keep it hidden, or at least they don’t

want it to be seen as central to their work. In the end, these groups are attempting to adapt to climate change without talking about “climate change”. One of the sub-committee leaders from Neskowin reported that climate change is latent in their group:

“climate change as one of the components it’s something they have to analyze. It’s buried a little deeper but it’s there. And that’s similar throughout all of this process. If you’re looking for something that says we’ve addressed climate change and here’s our banner it probably won’t show up in this but if you dig deeper it is in there all over the place.”

Used

Each project used climate change information in their work to some extent. In Neskowin, participants didn’t seem to agree to what extent climate change science factored into their work. Some participants, including one of the conveners, adamantly denied that climate change was considered as a factor upon which they based their series of recommendations. Others stated that they believed climate change was a significant factor.- Ellsworth Project members explained that climate change projections did factor into their work and that they are using credible data developed by scientists to support their decision-making processes. They explained, though, that they have to be careful in how they present the data to the broader community. PCW participants reported that there were no major decisions made by the PCW project in Phase One. Several project participants stated that they would hope that climate change would be a factor for consideration in future decision-making. The SLAWG project was heavily based on projections of sea level rise based on climate change,

though the group did not frame the science as being about climate change. They were careful to explain that their decision to propose the free board rule was based on projections of SLR and not climate change, per se.

Participants in Neskowin and Ellsworth commented that they have already felt the impacts of climate change in their communities and that they can use those already occurring impacts as support for doing their work. SLAWG members believed that their communities would not be concerned about these issues until they were directly affected by them. This is evidenced by the fact that only one community of the four, the one that has already experienced losses related to, passed the proposed ordinance. This may also be a contributing factor as to why the PCW was unable to rally its participants around a single issue of concern. The community has not yet experienced losses related to climate change impacts. The County Commissioner in Neskowin was clear in his expression that he is focused on the here and now.

“We’ve got problems now whatever the cause is. And we don’t want to get into the controversy of saying well I don’t believe in climate change so don’t do anything. We’ve got problems now.”

Sources of climate change information

Participants acquired information about climate change from a number of places. Primarily projects relied on information from scientists and technical professionals affiliated with, participating in, or leading the projects. In some cases scientists presented their own work, in other cases scientists presented data and technical information they gleaned from other

credible sources. The groups relied heavily on state and federal agency data sources and participants in all four projects mentioned the IPCC as a source of information. The PCW was the only case where participants did not mention the use of academic journals or published findings. This is not surprising as this group was not comprised of many academics and climate change became less of an issue for the group as the project progressed. The two local projects relied heavily on case studies of other communities. Lastly, only one participant from NCHC stated that he stayed up-to-date on climate change based on the news media. This individual however had a tertiary role on the project. One person from the SLAWG project discussed a climate workshop that he attended. This individual played a pivotal role on the project.

Table 13 - Climate change information sources

Information source	NCHC	PCW	EAP	SLAWG
University scientists/researchers	X	X	X	X
State agencies (ODFW, DOGAMI, Maine Coastal Program, DOT)	X	X	X	X
Federal Agencies (i.e.: NOAA, USACE, EPA, NWS)	X	X	X	X
International sources (i.e.: IPCC)	X	X	X	X
Academic journals	X		X	X
Case studies of other communities	X		X	
News media/ Popular culture	X			
Climate change workshops/training				X

Chapter 5 – Analysis and Discussion

Through this research I have investigated the nature of community-based groups that are working on climate change adaptation and have examined the extent to which these groups function collaboratively. The four case studies reveal a number of interesting points for discussion in each of the four investigative areas (Purpose and Participation, Roles and Leadership, Knowledge and Learning, and Climate Change Adaptation). First, an analysis of scale, local versus regional efforts, sets the context for deeper analysis in each of the four areas.

Local and Regional Efforts

I deliberately chose to assess cases studies that represent two different spatial scales for this research. Doing so provides grounds for comparison. However, in my research I found that spatial scale is even more important than I initially considered. Authors including Ostrom (2007) Cash et.al. (2006) and Adger et al. (2009) also emphasize the importance of scale, from a theoretical perspective. Further, the literature on biophysical scale has been more of a focus in the climate change adaptation literature and has appeared as less of a consideration in the environmental collaboration literature. The findings from my study reveal that scale is a highly important consideration, in terms of its merit regarding the practical implications of collaboration around climate change adaptation.

First, the local projects (Neskowin and Ellsworth) I assessed have clear purposes and a more community-based spirit than the regional cases (PCW and SLAWG). Hence, these local groups have stronger identities than the regional efforts. Wondolleck and Yaffee (2000) and Gray (1989) explain that the more local a project is in terms of scale, the more similar interests amongst participants will be, which results in the development of a stronger identity within the group. Strong group identity leads to more commitment (Wondolleck and Yaffee, 2000; this is discussed in more detail later in this chapter)

In line with the literature, my studies found that when groups are responsible for making decisions at the regional scale, they must work harder than local efforts to develop a strong group identity (Margerum, 2011). Participants in the local projects are highly engaged and these groups appear to be flatter than the regional initiatives. They are less hierarchical in their structure, they involve multiple leaders with varying levels of interest and expertise, and the majority of participants are actively engaged in achieving the group's goals. Several participants in the regional projects seem to be more passive participants, and the regional projects rely heavily on the direction of one or two more formal leaders. The distribution of responsibilities throughout group membership leads to improved identity which fosters stronger collaboration (Wondolleck and Yaffee, 2001; Daniels and Walker, 2000). Consequently, the two local projects appear to be more collaborative than the regional efforts.

Second, the literature indicates that the process of making decisions about a single community in a single community is less cumbersome than making decisions about individual communities using a regional scale approach (Margerum, 2011, Moser and Boykoff, 2013; Singleton, 2010) and my findings appear to support this notion. Natural resource and land use planning and management decisions are not made in a vacuum, subject to one person's beliefs about the importance of doing something or how something should be done. Rather, implementing a decision often requires the approval of a board or committee, or individual with decision-making or regulatory authority (Amaru and Chhetri, 2013). The SLAWG and PCW projects reveal that working at the regional scale fosters learning and information, but coming to and implementing a mutually agreed upon decision is an elusive goal. Singleton (2010) emphasizes this point in stating that the larger

the scale, the more asymmetrical the problems are, and the more elusive success becomes.

A SLAWG project participant states: “the fact that our group is loosely bound, we don’t have any regulatory or statutory or any type of authority to speak of, so it’s relatively easy for us to sit around and think about the issues from the regional perspective but a bunch of us need to go back to those around us and say okay now how can I translate that information into something that’s tangible for the community.”

Given these findings, future regional efforts should carefully consider the spatial scale of the adaptation initiative. Koontz et.al (2004) write that the biophysical scale of an effort is significantly related to how a group defines the problem as well as the opportunities for addressing the issues. Therefore, climate change adaptation projects should maintain a scale that is conducive for implementing its adaptation goals. This can be achieved perhaps by taking a county-scale approach and involving county decision-makers. Regional efforts can bring local communities together, promoting dialogue that supports the exploration of local issues, development of solutions, and alignment of decision-making. As Cash (2006) argues, issues of scale pose a number of challenges to environmental management.

Acknowledging the importance of multi-level and cross scale dynamics in the siting, and implementation of climate change adaptation projects early on may help avoid challenges related to scale that may arise later in the project.

Third, project issues and objectives should be meaningful to all of the members of the group (Gray, 1989; Wondolleck and Yafee, 2001). My findings demonstrate that regional projects often involve a broader array of stakeholders who bring to the project a more diverse set of interests and perspectives than the local projects. In the PCW, environmental

issues have been overshadowed by some members' concerns about economic conditions. The SLAWG project has been initiated to address sea level rise, but some members of the group are less dedicated to a tangible outcome than others, citing that they have more important things to worry about in their communities. It should be noted that it is possible that smaller scale, local community projects would also encounter these challenges as well (Ostrom, 2007). Ultimately, community based groups addressing climate change adaptation would benefit from identifying common interests early on and working to align interests throughout the project.

The regional and local projects are all similar in the fact that they are trying to work together and they are trying to do something that would be valuable for their communities. Members of all of the projects express the importance of having leaders, facilitators, and people who were there to push the group along. They are all interested in learning and sharing information that would help achieve their goals for the community. They are all in some way trying to adapt to climate change, though none of them would explicitly report that (this is discussed in more detail later in this chapter). In summary, the projects and their members were more similar than different, especially because they are all rural coastal communities, but the broader the scale, the greater the organizational challenge.

This is not surprising, given the theoretical literature on scale (Cash et al., 2006; Ostrom, 2007). Over the past several years work around climate adaptation has started to draw on the literature that addresses socio-ecological resilience. The concept of resilience seeks to make sense of these complex issues of scale that arise in the process of adaptation to climate change. Again, this literature is highly theoretical and much of it lacks a focus on the

practical applications of the theory. My findings indicate that further research that seeks to develop a more practical understanding of how to navigate complex issues related to scale is needed. This sentiment echoes the calls for more practical work displayed by Moser (2009, 2013) and others (Snover et al., 2007; Picketts et al., 2012; Lemiux et al., 2014).

Purpose and Participation

The development of a unified project purpose or the identification of a mutually agreed upon issues and goals is foundational to the collaborative work of a group (Gray, 1989; Wondolleck and Yaffee, 2000; Margerum, 2011; Innes and Booher, 2011). The Neskowin Coastal Hazards Committee illustrates how a group can work together to collaboratively develop a purpose that incorporates disparate interests. They have sought to protect the beach and the community, but they understand that doing so would be difficult.

Nevertheless, they have worked together as a group to explore options for achieving both goals. By engaging in dialogue in the process of developing their purpose they have identified mutual interests that create a foundation for group collaboration.

The development of a purpose that everyone agrees upon is not always as fluid as it was in the Neskowin group. In the case of the PCW, the group struggled to identify a mutually agreed upon purpose. The doubts some group members had about project leaders and their skepticism about why the group was convened hindered the group, especially in its early formation. One PCW member commented that: "Some of [them] thought it was a communist plot to environmentally take over the bay area and not allow developments and all of those things." At the same time, a few members criticized the group leadership for not having established a clear purpose for the group prior to inviting participants. They did not

understand the leadership approach. One outspoken PCW member stated: “The project has to get really specific on what it is that you want me to contribute to, what information do you need, and what is the question that you want me to answer?” In the Ellsworth and SLAWG projects, the project purpose was outlined prior to participant involvement. Conveners were clear that a purpose had been developed, but found ways to incorporate participants’ interests throughout the process.

In the absence of a mutually developed project purpose, groups must find ways to incentivize participation and project purpose support (Margerum, 2011, Wondolleck and Yaffee, 2001) My studies have found that participant incentives are linked to the purpose of the group. Interest in learning and concern about the issues are two frequently reported incentives. Conveners, therefore, should consider identifying participants who are concerned about the issues the project addresses. The conveners should frame the group as a learning community; participants working together to explore issues and options. Several authors emphasize the strength in learning together or co-learning (Daniels and Walker, 2001; Hegger et al., 2012; Wondolleck and Yaffee, 2000; Innes and Booher, 2010). Engaging in this co-learning approaches fosters collaboration, even in the absence of a mutually developed purpose (Daniels and Walker, 2001).

Through this research I found that these community-based groups were as much about the processes devised to address the issues as they were about the substantive issues themselves. When asked about project purpose, PCW participants referred to “fostering collaboration among a variety of stakeholders.” Ellsworth participants responded “to co-develop solutions”. SLAWG members remarked: “to get the four communities....to work

together to create a regional approach.” These projects represent three different approaches to involving stakeholders:

- 1- Involve as many stakeholders early on as possible and let them decide if the project is (or is not) worth their while, before participating.
- 2- Invite a set of key stakeholders and have them formally agree (ie: through an intergovernmental agreement) to the project such that they are bound to participate to the end.
- 3- Start with a core group of stakeholders. Bring in other relevant stakeholders as the project progresses to increase participation.

The literature about the social processes that community-based groups use to address climate change is scant (Hansen et al., 2012). Romsdahl (2011) asserts that there is still a need for documentation of cases that describe the different decision-making structures communities are taking on in their climate change adaptation work. Wolf (2011) adds that adaptation is a social process and asserts that more research is warranted that addresses process factors. Moser and Boykoff (2013) explain that studies of climate change adaptation processes are complex. Sociological, historical, and political factors unique to individual groups, or communities complicate our understanding of how to best work together on issues related to climate change adaptation. My research of these four case studies illustrates different decision-making strategies and structures being used by local and regional community groups and it describes processes for involving different stakeholders in climate adaptation efforts. Although these four case studies have addressed these research needs, given that my research only assesses four case studies, more

research of this kind in other communities is needed to better understand decision-making processes in climate change adaptation projects.

Multiple scholars claim that collaborative groups are more effective when they involve diverse stakeholders with a variety of interests (Leach, 2011; Gray, 1989; Wondolleck and Yaffee; 2000), though my research did not fully support this notion. While having diverse involvement from participants with different interests worked well in Ellsworth, the PCW struggled, in part, due to its diversity. I found that having a broad and diverse group of participants hindered the PCW from finding mutual interests. Additionally, the diversity of interests and variety of strongly held positions hindered the group from identifying a clear path forward that involved all members of the group.

Conversely, shallow groups that only represent a small sect of community interests may help the group get to a decision faster, but they risk disregarding other interests and opinions key stakeholders and the broader community may have (Margerum, 2011; Daniels and Walker, 2001). In Neskowin, the group lost a few members who had differing opinions from the majority of the group, and in the end, these individuals stopped participating. Although this attrition helped the group become more cohesive, the decisions made within the group were not representative of those interested parties. The creation of collaborative groups involves making choices about who is most important or relevant under constraints of limited time and space (Margerum, 2011; Cox, 2010; Daniels and Walker, 2001). Community-based adaptation groups, then should carefully consider who they involve in the process. Ultimately, conveners have to find a way to manage the tensions of collaboration in terms of size and diversity.

The literature purports that, to be successful, collaborative climate change adaptation groups should include key decision-makers in the collaborative process (Margerum, 2011; Dukes et al. 2011; Ensor and Berger, 2009; Adger et al., 2009; Moser and Boykoff, 2013). My research also indicates that this is a highly important consideration. Regardless of the group's size, a climate change adaptation projects should consider who may make decisions related to their collaborative work and involve them in the project in a meaningful way. The implementation of a project recommendation relies on the support and involvement of all relevant decision-making authorities. Without key decision-makers at the table these groups risk spending a lot of time working together for limited outcomes.

The literature also claims that climate change adaptation efforts involve decision-making in the stages of understanding, planning, and managing (Moser and Ekstrom, 2010). My research suggests that if decision-making is occurring at all three stages, that it is also important to foster collaboration at all three stages. Multiple authors emphasize the value in collaborative decision-making especially around environmental management (Wondolleck and Yaffee, 2000; Daniels and Walker, 2001; Margerum, 2011). My case studies reveal that when participants are actively involved in decision-making early on, in the understanding phase (Moser, 2010) in the project, as observed in the Neskowin project, that they will have more ownership of the work and will feel more compelled to work toward the mutually developed goals of the group.

Lastly, the literature suggests that community-based climate adaptation efforts should address decision authority and decision space (Daniels and Walker, 2001, Dukes et al., 2011; Margerum, 2011) That is, groups should consider what is within the purview of the

groups decision-making capacity and authority. The SLAWG project clearly illustrates the need for this consideration. Although the group came to a decision about how they could adapt to climatic changes, they as an entity were limited in their authority. In the end some participants felt that they had wasted their time working on making a decision that was not within the decision-making authority of the group. Groups should consider early on, what is within their control and seek to make decisions that leverage the actual decision-making authority that may be present within the group.

In the end, these case studies reveal that climate change adaptation work needs to consider people, and their participation and interests, as much as it considers the technical aspects of adapting. Climate change adaptation efforts can be enhanced by the meaningful participation of stakeholders early on and often in the process of adapting. Participants want to engage in decision-making processes, though it is important to communicate the decision-making limitations that may be present. Ultimately, collaborative approaches are manifested through meaningful stakeholder participation in decision-making at all stages of the climate change adaptation project.

Roles and Leadership

A number of interesting areas for consideration emerged when participants reflected on their roles in their respective projects. Ultimately, participants want to feel that their work is valued (Margerum, 2011, Daniels and Walker 2001; Gray, 1989). Participants in these case studies depicted the different ways the value for their work and participation was demonstrated. They appreciated being listened to and they seem to value an environment that is open to new, different, and differing ideas. The concept of commitment was also an

important aspect for understanding individual roles. My findings support the literature that emphasizes the importance of giving participants meaningful roles that actually contribute to the work of the group. When participants are meaningfully involved they are more apt to stay committed to the project over the long term (Daniels and Walker, 2001; Innes and Booher, 2000; Margerum, 2011). Several participants noted that adapting to climatic changes is a slow process and it takes a long time. Therefore, long term participation is highly important and keeping participants engaged over the long term is integral to doing effective climate change adaptation work.

Several participants reported that they felt listened to and that they could openly share their ideas and concerns. As one participant in Ellsworth reported: "I think that we have learned how to work together, how to bring people in and include them. We have learned how to listen to each other, which is super valuable." Another participant in Neskowin stated: that's another thing that is really wonderful about this committee is its willingness to listen to another point of view. We do a lot of that in meetings besides exchanging information." Being open to listening to one another provided a foundation for individuals to build relationships with each other, and thus emerged as an interesting concept to consider more deeply in future research.

Participants wanted to know what was expected of them and how they could contribute. Consequently, the division of labor and responsibilities across different members of the group seemed to keep members interested and involved. Participants were more dedicated to the project when they had a meaningful part to play, rather than being passive members.

The Neskowin group was highly collaborative and the workload was divided among the majority of participants. Wondolleck and Yaffee (2000) noted that the Huron River Watershed Council involved participants in a stream monitoring program. Through this activity, people developed a sense of identity with the project and stayed involved. In Neskowin, almost all of the participants had responsibilities and work to contribute to the group. Members were tasked with making and maintaining contacts with other groups, participating in writing land-use ordinances, and synthesizing findings from data sources and the engineering study they commissioned. Meaningful involvement shaped the perception of shared ownership on the project and fostered a sense of commitment from members of the group.

Climate adaptation takes a long time (Moser, 2013; Adger et al., 2009; Ford and Ford, 2011). Each of the projects I reviewed are over a year old, and one has been working together for over five years. Keeping participants interested, engaged, and committed to a project over the course of multiple years can be difficult, especially for those who just want to get something done in the short-term (Daniels and Walker, 2001). Project conveners can foster long-term commitment by providing opportunities for participants to share the work of the group. Sharing the work of the group leads to the development of shared identity, which, in turn, supports longer term commitment (Gray, 1989; Wondolleck and Yaffee, 2001)

Shared identity depends on a group's ability to identify mutual interests (Wondolleck and Yaffee, 2000). In the places where impacts are already being felt, especially in the two local projects, there is a pre-existing point of mutual interest. The Neskowin group has been

concerned about the loss of the beach that they all value highly. Ellsworth project members have experienced flooding events and culvert failures, which have served as a starting point for discussion. In the two regional projects, finding mutual interest has been more difficult. One of the four SLAWG communities has experienced climate-related impacts, while the other communities have not. The group has struggled to get the other three communities interested in addressing sea level rise and regard it as an urgent issue. PCW participants have recalled a history of conflict and distrust and have struggled to find areas of mutual interest. In some cases identifying areas of mutual interest may be difficult, though the effectiveness of the group's collaboration is predicated on the ability of the group to do so (Wondolleck and Yaffee, 2000; Gray, 1989; Margerum, 2011).

Although there is a broad array of literature that emphasizes the importance of leadership in general, literature that documents the experiences of leaders in the context of environmental collaboration and climate change adaptation is lacking. Gupta (2010) synthesizes the literature related to adaptive capacity and leadership and finds that collaborative, visionary, and entrepreneurial leadership styles exist. Adaptive capacity is improved, in part, by leadership emerging from within the community, and by leaders having the capacity to shape the group from within (Gupta, 2010; Adger et al., 2009). Interestingly, my findings indicate that there is a difference between leadership that emerges from within the group and leadership associated with convening the project. Leaders who emerged from the group appear to have a longer term commitment to the projects and a broader perspective on how to address the issues. Whereas leaders who convened the group were more focused on the discrete goals of the project and the timeline of the project (and their leadership responsibilities).

Also, interesting, is the idea that leaders in the PCW, SLAWG and Neskowin reported that they did not necessarily want to be considered the leaders. They preferred the roles of facilitator and information provider. They did not necessarily want to be involved with keeping the group focused and progressing and they were even less interested in the organizational responsibilities of planning meetings, taking notes, keeping group records, and being the point person for all matters related to the group. Leaders noted that they experienced difficulty, especially in the regional projects, with sharing leadership responsibilities that they did not want. Leaders must be willing to distribute or relinquish, not only the responsibilities that they don't want (i.e., the organizational roles) but also the more desirable responsibilities, like providing information, to promote a more collaborative approach (Walker and Daniels, 2012).

Several participants report that they appreciate having more than one leader, or a more distributed leadership structure. Walker and Daniels (2012) discuss how a distributed leadership approach fosters meaningful stakeholder involvement in natural resource decision-making. Having more than one leader allowed groups to divide primary responsibilities. Although the literature on leadership in environmental collaboration situations emphasizes the need for more distributed leadership approaches, there is not much known about how to best develop leadership from within community groups working on climate change adaptation.

Though not addressed directly in the interviews, trust was implied in many participant comments related to leadership. In the PCW a distrust for the group's leadership was apparent. Participants reported they were skeptical about why they were asked to

participate as well as why the group was convened. One participant reported that: “Some of them [PCW participants] thought it was in the communist plot to environmentally take over the bay area and not allow developments and all of those things.” Conversely in Ellsworth participants were engaged in a process of building trust. One participant reported: “Sometimes if you look at a group, they are very focused on what they want for an outcome instead of looking at a project as working together for an outcome. So you get a little weary of that type of thing because they want a certain outcome from it and I did not get that from this project. I am more under the impression that they are gathering the data to see what the outcome was going to be instead of creating a specific project with an outcome in mind. That is what I liked about this project the most.” Walker and Senecah (2012) have observed that trust is a critical factor in community-based collaboration and that the absence of trust is often associated with participants’ perception that they do not have a voice in the project. Many PCW members believed that they did not have the opportunity to contribute to the project in a meaningful way, and this perception added to stakeholder distrust for the leadership. Trust can be built, however, even in cases where a high level of distrust exists (Walker and Senecah, 2012; Margerum, 2011; Gray 1989). Future research should consider the ways trust can be built in community-based climate change adaptation initiatives where it is lacking.

Knowledge and Learning

Multiple authors explain that knowledge and learning are integral facets to any environmental collaboration or climate change adaptation situation (Daniels and Walker, 2001; Margerum, 2011; Moser, 2013; Shipper et al. 2014; Snover et al., 2007; Smit and

Waddell, 2006; Poncelet, 2004) Not surprisingly, learning was central to the work in each of the four cases. Learning appeared in the form of better understanding the issues, in addition to better understanding each other. Participants reported that they learned a significant amount about their community and each other in addition to the technical issues. In doing so these groups became community resources. The capacity to learn is positively associated with the capacity to adapt (Gupta, 2010) All of these groups engaged in learning in order to achieve their goals and they all valued gaining information that would help them address their issues. Although the groups are focused on adapting to current issues, by participating in these projects, they may also be building the capacity to adapt to other community issues.

This brings forth an important consideration regarding the difference between learning as an objective or as a means to an end goal. Ultimately these groups were focused on doing work to adapt to climate change in their communities and their learning aligned with their goals. In the end, the goals of the project were achieved through learning, though it could be the case that the goal of the project is to simply learn. As McDaniels and Gregory (2004) write, when learning is the objective of the group, stakeholders value information and the process of information seeking more highly than when learning is approached as merely a pathway to achieving other goals. Consequently, community groups addressing climate change adaptation should consider making learning an explicit objective of their efforts.

Multiple climate change adaptation and collaboration authors suggest a need for a process that allows participants the space to contribute their knowledge and information in a meaningful way (Wondolleck and Yaffee, 2000, Ensor and Berger, 2009; Walker and

Daniels, 2001; Adger et al., 2009). Procedural fairness in sharing information allows participants to feel that their information is valuable to the group, in some way. When participants feel like they are valued, they are more likely to continue participating and working toward the goals of the group (Wondolleck and Yaffee, 2000). Leach (2011) adds that the perception of equality is key for collaboration. Therefore, groups should equally value the different types of knowledge and information participants have to contribute. In the Neskowin project, software called BaseCamp was used as a clearinghouse for the information participants contributed. The site contains historical images of the area, technical reports, case studies of other communities etc. This software provided a physical space for different types of knowledge to be housed, but it also provided a conceptual space for participants to discuss information they found useful.

Effective facilitation is key for fostering procedural fairness within groups and participants' ability to share ideas and speak openly plays a key role in fostering open dialogue (Daniels and Walker, 2001; Margerum, 2011; Wondolleck and Yaffee, 2001). Facilitation services are often provided by individuals from boundary organizations, or groups that mediate the work of the group and create bridges between different stakeholder groups (Guston, 2001) Margerum (2011) explains that the collaborative process brings people together to address complex and uncertain issues and that facilitation is key for managing the dialogue in these cases. Leach (2011) agrees in asserting that all community-based collaborative groups should have skilled facilitators to equalize participant voices and give everyone a chance to "speak, vote, or veto." (p. 162). Participants in my study reported that they appreciated the facilitation role and believed that it was important for helping to give everyone an equal voice. One participant in the PCW felt: "You definitely need to have the facilitation. I think

that was important. And not just facilitation but somebody in a mediation type role to keep that kind of equal voice format that we've been using."

Both scientists and non-scientists participated in the projects I studied and contributed information that participants valued. The literature around climate change adaptation and environmental collaboration emphasizes the importance of both local and technical knowledge (Leary et al. 2008; Scipper et al., 2014; Ensor et al., 2009; Dukes et al., 2011) though community-based adaptation authors including Schipper et al. (2014) and Ensor and Berger (2009) write that technical information often overshadows local perspectives, and that local voices are highly important for effective climate change adaptation.

In my studies, many participants explained that they needed both technical and local knowledge to support the work of these groups. They considered the two information perspectives complimentary. Scientific and technical data could support the more local and traditional information and local and traditional information could ground truth the scientific and technical material. One participant from Ellsworth reported: "I think they are equally important and I think that everybody believes that they are equally important. We can't do any of the science without the local knowledge. The local knowledge is not getting them the science. So it's intertwined. You have to have both." In the SLAWG project, public works officials looked at vulnerability assessment maps and identified areas of vulnerability not presented on the maps. Scientists then incorporated this information into the maps. They could provide public works officials with information about how the vulnerable areas might be affected by future sea level rise. Community-based groups

working on climate change adaptation should be open to the ways that different local perspectives can be meaningfully incorporated into the projects.

Climate Change Adaptation

Through this research I have discovered that most individuals working in these climate change adaptation projects are not interested in better understanding the drivers of climate change. They are, though, very interested in addressing how climate change may impact their communities. Project participants talk about the specific issues relevant to their city, town, or region, such as sea level rise, flooding, erosion, or changing watershed conditions. One participant in Neskowin explains: “What they are experiencing are the impacts that are resulting from what I can conceive of as the driver of climate change. But I think that the abstract term of climate change is not something that most people connect with. It is about coastal erosion. It is about more flooding and more storms and it’s about what they are having to deal with in the immediate term.” Some individuals do not care if the impacts are linked to climate change. For example, an Ellsworth project member notes: “Climate change? The way that we look at it is that there are changes in the environment whether they are cyclical or because of pollution or whatever. There are changes we need to deal with. Whether they are long term or short term I don’t know.”

Given these findings, I found it interesting that when asked about their sources of climate change information, almost all participants cite sources including international, domestic, and state agency sources in addition to scholarly work from academic and professional journals. All of the projects rely on climate change information, though a majority of participants carefully explain that their project is not about climate change. As one

participant states: “If you’re looking for something that says we’ve addressed climate change and here’s our banner it probably won’t show up in this but if you dig deeper it is in there all over the place.”

Additionally I discovered that project participants do not talk about climate change as an issue. They acknowledge that climate change is controversial, complex, and abstract. As local communities they cannot do anything about its causes, but they can confront local effects. Despite the climate science consensus and well-publicized reports (e.g., the IPCC), some local people remain skeptical while others are indifferent. Reporting on a recent survey, Leiserowitz et.al. (2015) determine that 18% of Americans believe that global warming is not happening and 32% believe that any changes are natural. Furthermore, 74% of Americans “rarely” or “never” discuss climate change with their friends and family.

Project participants also explain that they could not do anything about climate change, but they could do something about the way their community will be affected by changing conditions. This sense of efficacy is important and has helped the project groups feel that their work matters and that they could have some positive influence in their community. Climate change is a global issue, while adapting to changing climatic conditions is a local concern. To this end, these project groups have identified risks related to climate change specific to their communities (flooding, sea level rise, erosion, changes in watershed conditions) and worked to improve their local communities’ adaptive capacity to these changes. Additionally, in three out of the four projects (EAP, SLAWG, and NCHC), participants feel that they are responding to current effects. They recognize that these

impacts are in some way related to climate change, but they explain that by focusing on present conditions they could demonstrate what could happen in their community.

The collaborative work of these groups has hinged on their ability to find a common language to discuss their issues. One participant from Neskowin asserted: “I care less about if people use the words I use and care more about if they are doing things to decrease their risk to coastal hazards, and I think we lose people sometimes by insisting that they use our language.” Another participant from SLAWG revealed: “(the planners) value things that speak to them in their language.” Participants in all four projects note that although climate change is foundational to their work, they talk about the issues in a way that keeps participants engaged. Their projects are all about climate change, in a way, but participants do not feel that they have to talk about “climate change” in order to do something about its impacts.

In the end, I have learned that community groups can work together on adapting to impacts related to climate change without discussing (or agreeing upon) the climate science. The fact that states like North Carolina, and more recently Florida, have banned state agency officials from working on and talking about “climate change” indicates that this is an ever more important finding to consider and investigate further. Authors like Suzi Moser (personal communication) would argue that eventually groups will have to talk about climate change drivers if they are going to successfully adapt over the long term. In the short-term, however, while community groups are forming relationships and learning about one another and the issues, it may not be appropriate to explicitly talk about the drivers of climate change in the beginning.

Successful climate change adaptation is (in part) associated with effective collaboration (Adger et al., 2005, 2009; Leary et al., 2008; Moser, 2013) Moser (2013) explains that collaboration among decision-makers and knowledge providers is integral to successful climate change adaptation. The notion of “successful adaptation”, however, is new in the literature. While Moser and Boykoff (2013) declare the pragmatic reasons for assessing success in terms of process and outcomes of climate change adaptation projects, others like Ostrom (2007) caution that socio-ecological systems are highly complex, uncertain, and unpredictable, and that researchers must consider the complexity of unique cases and avoid taking a panacea based approach. At the same time, environmental collaboration literature on success asserts that a “progress-based” approach is most appropriate given the uniqueness of individual collaborative situations (Dukes et al., 2009; Daniels and Walker, 2001.) Regardless of the measure of success, or progress, groups should consider how they will measure the process, progress, or outcomes of their work.

Project assessment may also consider the extent to which adaptive capacity was improved. Several authors write about the notion of adaptive capacity as a mechanism for determining the value of climate change adaptation work (Leary et al., 2008; Adger et al., 2009; Moser, 2013) The construct of adaptive capacity is conceptualized into a number of attributes and facets that provide a space for meaningful work, including learning, governance, resource procurement and allocation, diversification, and building and maintaining social capital (Gupta, 201; Adger et al., 2009) My case studies demonstrate that community-based groups are struggling with how to determine the value of their work, especially when their preconceived ideas about the direction of the group do not come into fruition. For example, in the PCW project, participants did not have a definitive measure of

success that was embraced by the entire group. They did however acknowledge that they learned a significant amount about the community and each other which improved social capital, which ultimately improves their adaptive capacity related to the issues at hand.

Adapting to climate change for many local communities is a lofty goal. Working at the community level to adapt to climate related risks, however, improves the overall adaptive capacity of the community and provides a starting point for measures of progress, or success. Although climate change adaptation may be the goal of a group, learning from one another and exploring new and different ways to make decisions may not be seen as “successful climate change adaptation” but it does improve the adaptive capacity of the community and should be valued accordingly.

In Conclusion

Climate change is expected to impact coastal communities in a number of ways. Local community-based groups are responding by engaging in projects with the purpose of adapting to these impacts, and some are doing so in a collaborative way. To date, research on adapting to climate change has focused more on scientific and technical aspects of the process of adapting and less on social interaction and human dimensions of the groups seeking to adapt. Interest in this area of inquiry, however, has increased over the past several years and has become a more prevalent area of concern in social science research.

This work was developed to add to a growing number of case studies that seek to better understand human interaction around adapting to climate change. I relied on climate change adaptation and environmental collaboration research to inform my inquiry. In doing so, four areas of consideration emerged. The research questions I posed at the onset

of this work sought to 1) obtain a better understanding of the purpose of these community-based projects and why individuals are participating, as well as how stakeholders are making decisions and collaborating as part of their participation; 2) gather information about the roles of stakeholders with a focus on leadership, and especially considering what roles are most important for climate adaptation work; 3) investigate what kind of information was valued, and what participants needed to know as well as what they learned through their participation and better understand the ways they were able to share and obtain information; 4) understand how climate change factors into the work of these group by assessing how it is discussed and used.

Through this research I found that effective collaboration around climate change, like other complex environmental issues, is not easily achieved. Community-based groups interested in to climate change adaptation should consider whether collaboration is the best approach for addressing their goals and if so, they should thoughtfully attend to a variety of factors that my research highlights. They should at least, work to collaboratively develop a purpose, when possible. Doing so can help keep participants engaged around a purpose that is of mutual interest. It is vital that conveners foster participation by those who have the ability to implement decisions and engage stakeholders who are willing to work together collaboratively. Additionally, groups should seek to maintain openness and create a space where different types of knowledge are valued, and they should consider learning together as an important facet of the groups work. Lastly, groups must recognize that finding a common language that describes their climate change adaptation work in a way that brings people together, rather than alienates them, is imperative for fostering

collaboration. If any or all of the factors are not attended to, groups run the risk of being ineffective and unproductive in their work.

The four case studies I presented illustrate ways in which local communities may adapt to climate change and the extent to which they could do so collaboratively. I have concluded that assessing community based efforts to adapt to climate change through a collaborative lens has value for better understanding the nature of these groups, how participants interact within them, and how they function. Thus, I have addressed the research needs for better understanding group dynamics in the context of adapting to climate change.

Future work should continue to consider new and innovative ways to bridge climate change adaptation research and literature on collaboration in environmental management and decision-making contexts, and other human dimensions of natural resources areas of interest. Researchers should attend to issues of trust and respect, fairness and inclusion, and finding creative discourses for addressing climate change. They should also consider matters of scale in relation to decision-making, fostering relationships, and identifying mutual interests among stakeholders. As noted throughout this work, this is a growing area of interest and researchers should thoughtfully pursue ways to address the importance of human interaction in the process of adapting to climate change.

Epilogue - Project Updates as of August, 2015

Neskowin Coastal Hazards Committee

An update according to one member:

The Neskowin Citizen Advisory Committee CAC [the local community association] submitted to the county land use planning commission their Neskowin sub-plan items relating to land

use. These were approved by the planning commission. These only apply to Neskowin, and mostly have to do with future development or rebuilding after damage. Some in the county think this is a good way to go, others dislike anything that infringes on property rights. The active protection stuff was all too expensive. Their best option is to keep improving the riprap system. The NCHC is no longer meeting. A handful of members are participating in another climate adaptation project focused on developing future scenarios based on policy decisions and different expectations for GHG emissions.

Partnership for Coastal Watersheds

An update according to one member:

The Partnership for Coastal Watersheds was awarded continued funding through 2015 and has continued its Phase 2 work. A number of members from the phase one project decided to pursue an effort to use the data collected in phase one of the project to support updating the county land use plan. This effort has drawn new members to the group, one of which is the county land-use planner. The group intends on working together and use their experience from Phase 1 to develop a meaningful product for the community.

Ellsworth Adaptation Project

An update according to one member:

This group is no longer working together, though they still check in with each other. The group is exploring new ways to work together through applying for new grants, though several of the members have moved on to different positions with other organizations. The group produced a paper about the scientific basis of the project, and intends to develop a paper about the social science aspects of their work.

Sea Level Adaptation Working Group

An update according to one member:

The group is not meeting as routinely as they were. Project conveners have taken to working with each individual town in any way they can. This includes helping them update land use, beach management, and comprehensive plans. Conveners are also working more significantly with local public works officials and they hope to continue engaging with them around issues related to sea level rise.

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Appendices

Appendix A - Interview Questioning Guide

Interview Questions

1 - Purpose and Participation

Q1 - Please describe the purpose of this project.

Q2 - How would you describe your affiliation with this project? In what capacity are you participating?

Q3 - Why are you participating in this project?

Q3a - What are the reasons you got involved initially?

Q3b - Why do you continue to participate?

Q4 - To what extent do you regard this group as “collaborative” ? 1-10 scale

Q4a - why did you rank it this way?

Q4b – How are decisions made?

2 - Roles and Leadership

Q5 - What is your role or roles in this project?

Q6 - How do you know what your role is?

Q7 - Has your role(s) changed throughout the process?

Q8 - In what ways do you contribute to this project in this role(s)?

Q9 - What roles are important to the productivity (or work) of this group? Why? Who plays those roles?

Q10 - Are there any important roles that have not been filled? How does the group deal with that?

Q11 - Who do you consider the leader or leaders of this project?

Q12 - Why do you consider these people the leaders?

Q12a - What leadership characteristics do these people exhibit?

Q12b - What leadership actions do these people do?

Q13 - How does this group determine its leaders?

Q13a - Have these people always been the leaders?

3 - Climate change

Q14 - How important is climate change to the work of this group? 1-10 scale

Q14a - Why did you rate it this way?

Q15 - What climate change issues does this project address, if any? Why these issues?

Q16 - Who or what are the sources of information about climate change for this project?

Q17 - How is climate change information used, if at all?

Q18 - How does this group talk about climate change, or do they?

Q19 - How does climate change factor in to the decisions of this group?

4 - Knowledge and learning

Q20 - What are/were the most important knowledge and information needs of the group? How have/are these satisfied?

Q21 - What have you learned through your participation in this project?

Q22 - What knowledge or experience have you contributed or taught to others throughout the project?

Q23 - How have you been able to contribute this knowledge?

Q24 - What do you think this group has learned together?

Q25 - How has this group learned together?

Q26 - How much does this group value scientific and technical knowledge?

Q27 - How much does this group value local or traditional knowledge