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Adapting to Climate Change: The Case of Multi-level Governance and Municipal Adaptation Planning in Nova Scotia, Canada

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Graduate Program in Geography
A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy
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Abstract

Nova Scotia is the only province in Canada to use the gas tax as a financial incentive to create a regulatory mandate for ‘Municipal Climate Change Action Plans’ (MCCAPs). The MCCAP adaptation policy mandate initiated and enabled climate change vulnerability assessment and the development of climate risk priorities and adaptation plans to uniformly occur at the local scale in 53 Nova Scotian municipalities. This dissertation seeks to answer the question: What are the social factors that impacted municipal climate change adaptation policy and planning processes in the multi-level governance context of Nova Scotia’s MCCAP?

The study develops and operationalizes a thematic, functional conceptual framework and exploratory, descriptive case study research approach for conducting adaptation case studies and comparative analysis of municipal adaptation planning processes in multi-level governance contexts. The framework enables thematic investigation and discussion about the social factors impacting municipal adaptation policy and planning processes in multi-level governance and municipal case settings. The study utilizes content analysis of adaptation plans in combination with focus groups, an iterative online survey and targeted interviews conducted with adaptation stakeholders to explore, describe and illustrate what and how social factors impacted the MCCAP process in Nova Scotia municipalities. The mixed methodology provides a pragmatic approach to generate data from which to compare evidence of the social impact factors that affect municipalities’ adaptation planning and policy development processes in multi-level governance contexts. The study offers new empirical and conceptual insights into the ‘how and what’ of municipal climate change adaptation policy making processes in multi-level adaptation governance contexts. The study conceptually affirms that significant resource and capacity-building gaps, a lack of governmental coordination, low levels of public demand and aspects of cross-scalar political leadership hinder and constrain adaptation capacity building and policy integration in municipal processes. Institutional fragmentation and lack of multi-level policy coordination may be key social factors impacting Nova Scotia municipalities’ adaptive capacities and the prospects for long-term resiliency and adaptation to climate change risks impacting communities at the local scale.

Keywords

Municipal climate change adaptation planning; case study analyses; Nova Scotia, Canada

Co-Authorship Statement

Chapter 3: Studying Local Climate Change Adaptation: A Heuristic Research Framework for Comparative Policy Analysis

Vogel and Henstra, 2015

Dr. Daniel Henstra (University of Waterloo, Political Science) provided a SSHRC Insight Development Research Assistantship to Brennan Vogel in order to contribute towards the co-generation this research article. Henstra and Vogel worked collaboratively on the co-production and editing of this paper, published in *Global Environmental Change* (2015, 31:110-120).

Chapter 4: Adapting to Climate Change: Local Governance, Municipal Policy and Planning in Nova Scotia, Canada

Vogel and McBean, 2015

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Operational Definitions

Adaptation

Adaptation is conceptualized as the social process of human adjustments and responses when anticipating and planning for future impacts associated with actual and projected climate change, in order to avoid harm or take advantage of new opportunities (IPCC, 2001; Smit, 2000)

Adaptation governance

This PhD study utilizes Moser's definition of adaptation governance as 'the sets of decisions, actors, processes, institutional structures and mechanisms, including the division of authority and underlying norms, involved in determining a course of action [for adaptation]' (2009:315). According to Moser, case-based adaptation governance research is primarily concerned with four key areas of inquiry: 1. The construction of the adaptation decision-making arena; 2. The actors involved in initiating and/or taking responsibility for the development and implementation of adaptation policy and planning options; 3. The stakeholders who influence adaptation decision-making; and 4. The actual decision-making outcomes of adaptation governance interventions and processes. It should be noted that adaptation governance is a limited social process conducted within structures and institutions of government (Adger et al., 2009) including at federal, provincial, urban and municipal spatial governance scales (Dickinson and Burton, 2011).

Adaptation policy making

This study scopes adaptation policy-making as a public process that purposefully leads to administrative and sectoral outputs (e.g. policy making processes and activities, government decisions) intended to intentionally and substantially attempt to reduce contextual vulnerabilities associated with current and projected climate change in case contexts (Dupuis and Biesbroek, 2013). Dupuis and Biesbroek identify a 'dependent variable problem' in conducting comparative adaptation policy research in that comparative adaptation policy research designs can be problematized by the lack of common independent variables through which to draw rigorous comparative inferences between cases. To date, problems of comparability have hindered the theoretical development of the social factors that impact municipal adaptation policy-making processes in multi-level governance contexts.

Adaptive capacity and adaptation capacity building

Smit and Wandel (2006) defined adaptive capacity as the operationalization of the concept adaptation in human systems, offering that adaptive capacity can be conceptualized as a function of: i) access to economic resources; ii) equitable distribution of resources; iii) access to technology; iv) access to information related to climate variability and the skills to make use of this information; and, v) institutional adaptive capacities. Institutional adaptive capacity describes the adjustments required to rules, rights and decision-making procedures relevant to stabilizing societal activities in more or less predictable and desirable ways, in the context of responding to actual and projected climate change impacts (Ekstrom and Moser, 2013; Young 1999; North, 1990). This research uses the term adaptation capacity building to collectively refer to these five conceptual dimensions of adaptive capacity. These social factors are deemed to be of investigative interest in the case of adaptation policy and planning development in multi-level governance policy-making environments, such as the Nova Scotia 'MCCAP'.

Multi-level governance

Multi-level, multi-stakeholder and multi-nodal governance processes of planning and policy-making that occurs across and within various levels of government (Horak and Young, 2012). Two conceptual dimensions of multi-level governance structures include: i) the vertical relationships between higher and lower levels of government (e.g., between federal, provincial, municipal); and ii) the horizontal relationships across the same level of government (e.g., across provincial departments, across municipalities). Differential policy power influences on governance agenda-setting, resource distribution and cross-jurisdictional issues of authority and policy responsibility (Horak, 2012) in multi-level governance systems provide conceptually thematic bridges to the

adaptation governance and policy making literature (Corfee Morlot et al., 2009), introducing a conceptual nexus worthy of deeper scholarly analyses and illustrative exploration and description to advance adaptation theory development. This gives rise to the need for using new terminological lexicon to explain complex social phenomena associated with climate change governance.

Multi-level adaptation governance

This refers to the cross-scalar governance environment and social policymaking landscape that affects processes of climate change adaptation policy and planning, particularly at the local scale (Horak, 2012; Corfee Morlot et al., 2009). Considering municipal adaptation policy and planning case contexts nested within hierarchical multi-level governance structures and institutions offers a ‘revealing diagnostic entry point into the structural governance context’ of local adaptation policy making and the social factors that impact local adaptation policy and planning capacities (Moser, 2009:317). Multi-level adaptation governance conceptually focuses analytical attention on the policy coordination problems, associated governance differences and social dynamics of policy power, resource distribution and cross-jurisdictional issues of authority and responsibility between levels of government (Horak, 2012). This is the key social aspect of investigative interest in this study. Introducing new conceptual terms such as multi-level adaptation governance may provide a conceptual framework approach for better scoping and operationalizing case studies of adaptation policy making, particular in the case of ‘intentional, substantial and concrete’ adaptation policy-making in multi-level governance environments, such as the Municipal Climate Change Action Planning policy mandate of Nova Scotia, Canada (Dupuis and Biesbroek, 2013; SNSMR, 2011).

Case study: Multi-level adaptation governance

Developing conceptual and empirical understanding of the dynamics present within single case settings using data collection methods such as documents, interviews, questionnaires, and observations to provide description, test theory and/or generate novel theory (Eisenhardt, 1989). MCCAP documents, focus groups and an iterative online survey, as well as interviews with Nova Scotia adaptation stakeholders are used to provide thick, rich descriptions to generate new conceptual propositions and advance theory in this study (Baxter and Eyles, 1997).

Exploratory, descriptive case study analysis

This case study research method is suggested for use in contexts lacking a clear single set of outcomes and in order to describe interventions and real-life phenomena in the context in which they occurred (Yin, 2003). The exploratory descriptive case study approach is deemed justified as the MCCAP of Nova Scotia is Canada’s first and only case example of a provincial-municipal multi-level adaptation governance policy and planning framework to use a monetary incentive to initiate adaptation planning uniformly at the municipal scale.

Within case study: MCCAP adaptation planning processes in Nova Scotia municipalities

This case study research design provides descriptive detail using internal units of the case study to contribute to enhancing across within case, individual case comparability. Individual case examples can be used internally within the case to describe, explore and illustrate the larger dynamics within the case study, including consideration of variations across individual cases (George and Bennett, 2005; Eisenhardt, 1989). This study produces data at the aggregate provincial level and at the within case municipal level of MCCAP planning and policy making processes in three purposively selected municipalities (e.g., Amherst, Bridgewater and Shelburne) to illustratively explore, describe and contrast the social factors impacting adaptation policy initiation, capacity-building and integration in Nova Scotia municipal multi-level adaptation governance.

Collective or multiple case studies

Research that describes purposively selects cases in order to elaborate on the similarities and differences within and across cases, and in order advance comparison and contrasts of empirical results with conceptual findings (Baxter and Jack, 2008). This study uses within case analysis of municipal adaptation planning as the platform for conceptual discussion with external literatures related to adaptation and multi-level governance.

Chapter One

1 Introduction

The influence of human activity on the global climate system is clear, and it is projected that average global surface temperatures are very likely to be more than 1.5°C warmer by 2100 than they were in 1850 (IPCC, 2013; IPCC, 2007). There will be changes in occurrences of extreme events; for example, more hot days, heavier precipitation events, intense marine storms with higher storm surges, due in part to sea level rise and associated impacts (IPCC 2014ab; IPCC 2012). Across Canada and in nations around the world, rural and urban municipalities face multiple planning and governance challenges adapting to the changing climate's influence on the frequency, duration, severity and intensity of current and future climate-related risks and hazards. As a result, climate change adaptation is emerging as both a local planning and multi-level governance policy making priority in order to reduce vulnerabilities and build municipalities' adaptive capacities to reduce risks associated with climate change impacts.

Climate change impacts such as the increasing frequency and/or severity of extreme weather events and the longer-term challenges of sea level rise and/or catastrophic interference with the global climate system, present real risks to people, infrastructure and the future of sustainable livelihoods across scales. The general objective of municipal climate change adaptation planning is to proactively plan ahead in order to reduce vulnerabilities to the potential risks and harms of climate change impacts at the local scale, while taking advantage of new opportunities for reducing risks. Two categories of climate change adaptation planning interventions in coastal zones can be broadly characterized, including: 1. varying combinations of defense in the form of 'hard' infrastructure (e.g., sea walls, dykes); and/or, 2. planning 'soft-path' policy approaches for climate risk management (e.g., changes to processes, regulations, codes, bylaws), in order to enable adaptive capacities for protecting, accommodating and/or retreating from climate change effects and impacts (Arlington Group et al., 2013; IPCC, 2012).

1.1 Studying municipal climate change adaptation in Nova Scotia, Canada

Given the localized nature of climate change impacts, multi-level governance policy and planning architectures that can contribute to both ‘hard’ and ‘soft’ adaptive capacities ultimately can contribute to climate change adaptation and resiliency at the local level. Multi-level adaptation governance is an integral component to advancing adaptation through governance structures and institutions, and requires cross-scale collaborative efforts to address complex issues of climate change risk occurring at the local scale (Abunnasr et al., 2013).

However, climate change adaptation policy and planning occurs within complex governance processes that are affected by many social variables. The political institutions, structures and processes occurring at higher levels of government (e.g., national and provincial scales) shape how adaptation policy frameworks occur and function at the subordinate municipal level (Bulkeley and Betsill, 2005); including the nature of incentive structures, resources, and policy supports available for advancing municipal adaptation policy and planning (Dickinson and Burton, 2011; Schipper and Burton, 2009; Burton et al., 2007; Burton et al., 2002). Horak (2012) describes how multi-level governance differences in policy power can affect municipal policy-making in relation to: i) agenda-setting; ii) resource distribution; iii) jurisdictional authority; and, iv) cross-scalar, institutional aspects of multi-level governance coordination that materially can affect the movement of plans to implementable policies and actions, particularly at the local scale.

In addition, many other social and political variables can also differentially affect the abilities of municipalities to plan and prepare for climate change impacts at the community level. For example, place-based differences in factors such as proximity, exposure, knowledge or past experience with climate change risks and hazards can shape and affect how municipal decision making processes and local policy priorities for adaptation are determined (Baynham and Stevens, 2014; Tang et al., 2010; Bassett and Shandas, 2010; Birkland, 1998). At the individual decision making level, stakeholder differences in risk perception and tolerance, as well as individual knowledge and

understanding of climate change may relate to the variation in levels of political motivation or leadership willingness to support efforts to address climate change issues. These complex, social dimensions can shape the adaptation decision-making and risk prioritization processes in significant ways (Hjerpe et al., 2014; Burch, 2010).

In Canada, variability in provincial policy making approaches for incenting municipal climate change adaptation is an increasingly important subject. For example, recent findings from the National Municipal Adaptation Project indicated there is considerable variability in the level of municipal engagement in adaptation planning in Canada, and the extent to which communities are engaged in adaptation may relate to the strength of provincial policies, funding and support (Hanna et al., 2014). The survey of 481 municipalities from across Canada also found that support and leadership from land use planners, other municipal staff and local politicians are important social factors for advancing adaptation planning at the local level. Other case study findings on municipal climate change policy and planning indicated a high degree of variability in Canadian municipalities' abilities to determine the contextualized, local-scale risk and hazard conditions that are associated with climate change. Examining the dual roles of municipal planning capacity (e.g., resources, staff) and municipal decision makers' perceptions of climate change risk as potential social factors affecting the quality and robustness of municipal climate change planning, have been recommended as two research priorities for scholarly attention in municipal adaptation policy and planning case studies (Baynham and Stevens, 2014).

This dissertation specifically examines municipal climate change adaptation planning and policy making in Nova Scotia, Canada through exploratory, descriptive case study analysis. The broader goal of this case-based research is to further add and contribute to emergent understandings of the socio-political factors that initiate and influence the development and implementation of municipal climate change adaptation plans and municipal adaptive capacity-building initiatives, in the broader Canadian context of the multi-level governance of climate adaptation policy and planning.

This descriptive and exploratory adaptation planning and policy making case study considers the case of the Canadian coastal province of Nova Scotia, and its municipalities. Nova Scotian municipalities were required by provincial policy mandate to complete municipal vulnerability assessments and the prioritization municipal climate change risks and actions as a mandatory municipal reporting requirement to develop 'Municipal Climate Change Action Plans' (MCCAPs) for the provincial Department of Municipal Affairs (SNSMR, 2011). Nova Scotian municipalities were given from 2011 until 2014 to complete these plans as a part of the MCCAP policy mandate, or face the risk of non-compliance with the provincial reporting requirement, and thus face the consequential risk of delaying or forfeiting the valuable multi-level financial transfer of federal gas tax funding.

At this early stage, it is important to note that in Canada, revenues collected from the excise tax on gasoline by the federal government provide a valuable funding stream for financing municipal infrastructure. The gas tax is collected by the federal government and transferred to all Canadian provinces for administration and re-distribution to their subordinate municipalities. Gas tax funding is utilized predominantly by Canadian municipalities for spending on the maintenance and development of municipal transportation, water and wastewater infrastructure and services, with varying degrees of provincial oversight with respect to gas tax spending (Connelly et al., 2009). The gas tax funding mechanism represents a particularly valuable source of revenue for all Canadian municipalities, given Canada's tripartite governance system and the jurisdictional differences in taxation policy power that exist between the three levels of government in the country.

For example, with the exception of municipal jurisdiction over property taxation, Canadian municipalities have little control over the implementation of taxation measures to raise revenues to fund basic services and development activities. Therefore, Canadian municipalities are to a large degree reliant on provincial and federal government transfers of funding, such as the gas tax, in order to sustain infrastructure and services that are developed and managed at the local scale. In the illustrative example of the gas tax funding mechanism, this revenue stream contributes to servicing, maintaining and

developing the municipal water, waste-water and transportation infrastructure that sustains Canadian communities with the clean drinking water, sanitized waste water and operable roads and transit systems they depend and rely upon as a part of their daily quality of life and community well-being.

Within this complex, over-arching multi-level governance funding context, the bounded case study of this dissertation specifically explores the adaptation policy innovation implemented by Nova Scotia's Department of Municipal Affairs to leverage the gas tax funding mechanism as a means of monetizing and incenting subordinate municipalities to create MCCAPs that specifically required assessing municipal vulnerability and developing prioritized adaptation actions at the local scale.

This study describes and explores the socio-political factors affecting the development of Nova Scotia's provincial and municipalities' adaptation policy and planning processes. From a research perspective, the homogeneous policy environment created by the provincial MCCAP policy mandate and municipal gas tax reporting requirement offers a unique example of a quasi-independent variable to explain adaptation initiation. The case presents a very unique research opportunity for describing the social conditions leading to the emergence of the MCCAP policy mandate, as well as opportunities for conducting within case comparisons of individual municipal MCCAPs case studies. The variability in municipalities' adaptation planning processes similarly tasked with completing the MCCAP reporting requirement are analyzed and explored in depth. The study adds and contributes to broader bodies of adaptation literature and policy discussions related to impactful social conditions that enable adaptation. This study proposes three thematic stages for studying adaptation policy to enhance conceptual development: i) adaptation policy initiation; ii) adaptive capacity building, and; iii) integration of adaptation plans and policies at the local, municipal scale in multi-level governance contexts.

This detailed case study research aims to document and generate new knowledge about the 'how' and 'what' of multilevel adaptation governance policy incentive-structures for enabling municipal climate change adaptation planning processes. In doing so, this research aims to contribute to advancing concepts, theories and applied practices related

to the impactful social factors and multilevel governance conditions that can enable adaptation and adaptive capacity-building at the local scale.

1.1.1 Climate change and municipal adaptation in the coastal zone

Communities in coastal zones are planning for the impacts of climate change to widely varying degrees, in the face of both rapid and slow-onset climate change impacts, such as extreme weather events and the climatic-ocean dynamics of sea level rise. Taken together, the increased risks of extreme weather and sea level rise present serious policy and planning challenges for governance occurring at multiple spatial and temporal scales in coastal areas (Wheeler, 2011; McBean and Rodgers, 2010; Yamin et al., 2005; Burton et al., 2002; Smit et al., 2000).

Increasing levels of coastal erosion due to inundation and flooding from extreme and intensified weather events, such as storms and hurricane-associated storm surges, illustrate the types of climate change related risks and hazards that face communities in coastal zones. Longer-term sea level rise is similarly expected to exacerbate these types of climate-change related hazards and risks (IPCC, 2012; Natural Resources Canada 2008; Natural Resources Canada 2004).

Contextual vulnerability to the cumulative impacts of climate change also results from the combination of exposure (in terms of place-based proximity to climate change hazards and risks), with sensitivity factors, such as complex socio-economic and demographic vulnerability variables (e.g., age, income, education, and occupation) occurring at variable scales (e.g., individual, local, regional). Combined geographic exposure and social sensitivity factors also contribute to the differential social construction of vulnerability and climate change risk between locations (Cutter, 2006).

Adaptation has been defined as ‘adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities’ (IPCC, 2007). Smit et al. (2000:240) effectively framed some of the challenges for evaluating the process of how adaptation planning occurs, noting that ‘the question how does adaptation occur can be answered on the basis of numerous

attributes relating to *process* and to outcomes, and is closely connected to ‘who or what adapts’ and ‘adaptation to what?’ (Smit et al., 2000:240).

In the case of this research seeking to provide insights about the ‘how’ and ‘what’ of the Nova Scotia MCCAP process, answering the ‘who’ question is clearly bounded to the municipal land-use planners and adaptation stakeholders involved in the MCCAP multi-level governance mandate. Further articulation of the research context, the background of this study design and the methodology used for case investigation is offered in Chapter Two and Appendices.

1.1.2 Adaptation planning and governance research: inquiry and relevance

Bridging gaps between adaptation theory and institutional practices of adaptation governance presents a challenge for both academia and broader society (Moser and Boykoff, 2013; Adger et al., 2009a). Research into the ‘how and why’ of adaptation decision-making necessitates meticulously careful consideration of the dynamic social processes at work within adaptation governance structures, processes and mechanisms (Smit and Wandel, 2006). As Agrawal and Perrin (2009) put it, such formative research is ‘necessary both for deepening the theoretical understanding of the role of institutions in the context of climate change, and using such theoretical understanding to guide policy debates and discussions’ (cited in Adger et al., 2009a:353).

In discussing the adjustment of human systems to climatic stimuli, Pelling (2011:17) has noted that climate change adaptation should be understood as a *process* rather than a product, implying that adaptation should be seen as a cross-scalar, iterative and ongoing social activity. As such, nascent manifestations of adaptation policy making processes (e.g., Nova Scotia MCCAP) offer valuable windows for scholarly observation, research and analysis. Pelling also argues that the discrete capacities, actions and outcomes of adaptation processes relate to socially constructed limitations that are rooted in culture and society, and reflected in the subjective discourses of climate change adaptation policy and planning.

In this vein, this dissertation considers the ‘discourses’ of municipal climate change adaptation policy and planning processes in the province of Nova Scotia, Canada. From this perspective, the goal of exploring and describing the differential aspects that affect Nova Scotian municipalities’ adaptation planning processes can allow for the generation of new conceptual and applied insights into the comparative ‘how and what’ factors that may enable or affect social capacities for local adaptation integration and implementation, at the municipal scale in multi-level governance contexts. The insights generated in this exploratory, descriptive PhD study aim to document the ‘how’ and ‘what’ of the MCCAP in order to contribute salient analysis to inform future studies about the impactful social factors affecting adaptation policy and planning processes in the field. It is acknowledged that greater longitudinal and breadth research and data analyses is likely required in order establish more scientifically rigorous casual linkages and correlations about the social factors that enable and constrain municipal adaptation planning and policy in multi-level governance contexts.

Moser (2009) has described a systematic research approach to examining adaptation governance issues through consideration of the levers of adaptive capacity (e.g., availability and equitable distribution of resources, technology, information and skills, infrastructure and institutions) acting on the fulcrum of governance structures and processes. In this approach, Moser defines governance as ‘the sets of decisions, actors, processes, institutional structures and mechanisms, including the division of authority and underlying norms, involved in determining a course of action’ (in Adger et al., 2009a: 315). Moser highlights the importance of decision makers as a part of the embedded social context of governance, where social and cultural norms, politics, economics, community stakeholders and private sector interests can influence adaptation decisions. Moser asks four fundamental framing questions in her valuable theoretical contribution: ‘Exploring the soft underbelly of the adaptation decisions and actions’.

These questions include:

1. *In which arena are adaptation decisions to be made?*
2. *Who initiates or has responsibility for developing adaptation options? Who has potential decision making and implementation authority?*
3. *Who influences adaptation decisions?*
4. *What are the outcomes of decisions once made, and how do the decision makers and affected stakeholders live with them?*

Exploring these questions through case-based research and analysis of climate change responses at the local level presents an opportunity to develop further understanding of adaptation governance processes. Local adaptation policy and planning in multi-level governance contexts presents both an under-researched and under-conceptually theorized domain, and thus provides an opportunity for developing methodological innovation in case study approaches to bridge conceptual/empirical lacunas in knowledge.

New case study approaches to explore and describe current manifestations of municipal climate change adaptation planning and policy cases can contribute to furthering the conceptual development of theoretically sound concepts of the enabling, social impacts factors affecting local climate change adaptation planning and policy in broader multi-level governance contexts. In turn, this contributes towards better advancing and mobilizing knowledge related to the enabling conditions for municipal adaptation policy and planning in other contexts, while contributing a method for generating insights into the ‘how’ and ‘what’ of adaptation policy-making in multi-level governance contexts.

Planning for the future uncertainties of climate change interactions, affected by human societies’ decision making processes, structures and institutions, present uncharted waters for the human species (Manuel-Navarette and Pelling, 2015). Fundamentally, one of the great challenges of the age is that multiple levels of political decision making, economic activity, and social practices are at odds with long-term goals of ecological sustainability. Pelling (2011) argues that adaptation must ultimately be viewed as a long-term process that entails transformative social changes (including politics, economics and culture) to ensure global sustainability.

Social transformation obviously has many dimensions involving many stages of social change, including through adaptation policy development. It is here that multi-level

adaptation governance and municipal policy making for climate change adaptation finds itself nested within broader contentious and challenging conceptual waters of case research seeking to examine local adaptation planning for reducing the complex uncertainties associated with current and future climate change impacts and environmental sustainability. At the root, reducing long-term vulnerability require reducing the dangerous levels of greenhouse gas emissions which are anthropogenically forcing the global climate. Simultaneously, human societies are also challenged to adapt to the already induced and assuredly continuing biophysical impacts associated with climate change. Both mitigation and adaptation presents monumental societal challenges for local scale stakeholders constrained by lack of resources and capacity, in broader multi-level governance environments and multi-scalar social, economic, political and environmental contexts.

This research follows an integrated systems perspective, articulated by Pelling (2011) and others, as a valuable philosophical basis required for addressing root causes of complex, long-term problems such as climate change. From this perspective, the global failure to reduce greenhouse gas emissions ultimately arises from deep-seeded paradigms of continual economic growth and exploitative land use and resource development patterns and practices. Addressing climate change at its root ultimately entails radically changing political, economic, and social systems that are premised upon relentless growth, accumulation, and commodification and exploitation of resources (Daly and Goodland, 1996), while unaccountably producing externalities of waste and pollution (e.g., atmospheric emissions of carbon and nitrogen from fossil fuel extraction and combustion).

Understanding the social construction of vulnerability to climate change and the limits to adaptation requires a central conceptual acknowledgement. Vulnerability is typically understood to be a function of exposure to risks and hazards, sensitivity to harm and capacity for resilience. That is, while an array of environmental conditions can predetermine the place-based exposure to climate change risks, the sensitivity and resilience functionalities of vulnerability are socially determined (Wilbanks and Kates, 1999).

Integrated climate change adaptation planning and multi-level governance approaches to reduce sensitivity and strengthen resilience must be negotiated through institutional decision making processes. Ideally, robust climate change policy and planning integrate both adaptation and disaster risk reduction as well as greenhouse gas emissions reductions (Swart and Raes, 2007; Yohe, 2001). From this holistic perspective, reducing long-term sensitivity to climate change relates entirely to the root cause of the problem: addressing anthropogenic greenhouse gas emissions from an economic system premised on endless, fossil-fuel based growth and the broad socio-cultural inertia and commensurate political failures to adequately address emission reductions to the scale that climate science implores is necessary for the aversion of catastrophic interference with the global climate system (IPCC, 2013).

In this view, the long-term, place-based exposure to future climate change risks and hazards, and the varying social resilience capabilities to differentially adapt, relate directly to current efforts taken (or not taken) to mitigate rising greenhouse gases from land-use change, human, industrial development patterns and societal energy consumption.

As Adger et al., (2009b) insisted, comprehensive adaptation must also consider societal goals, values and social choices about climate change risk as integrated. Greenhouse gas emissions reductions are ultimately both risk mitigation and climate change adaptation measures: inter-connected and mutually reinforcing phenomenon required in any coherent adaptation and long-term disaster risk reduction policy making approach to climate change risks. Yet, despite the indivisibility of mitigation and adaptation, divisive conceptual issues continue to challenge effective climate change governance across scales, bifurcated by adaptation and mitigation cognitive silos (Swart and Raes, 2007). In this larger conceptual discussion, truly in a long-term and holistic perspective, mitigation is the best form of adaptation. However, for the purposes of this PhD study, the conceptual research focus will remain predominantly fixed on a bounded assessment of the ‘how’ and ‘what’ of municipal adaptation planning and policy making in broader multi-level governance contexts, using the Nova Scotia MCCAP case study as a means of

developing further knowledge of the social factors that impact local adaptation efforts in multi-level governance contexts.

1.1.3 The social context of adaptation: barriers and opportunities

At the local level, the political, economic and social issues associated with addressing climate change issues are nested within larger global contexts and debates pertaining to the ways and means for human society to achieve ‘sustainable adaptation’ development pathways in a climatically altered world (Eriksen and Brown, 2011). Pragmatically overcoming sensitivity and vulnerability to climate change requires political, economic and social innovation to facilitate development practices that can achieve effective adaptation to increased levels of climate change risks, while also integrating practices and technologies to reduce current levels of emissions contributing to severity and extent of future climate change.

Complex governance challenges to climate change adaptation planning have been observed in processes of local adaptation policy and planning. These challenges emerge from a number of interacting social factors, including:

- Multi-layered institutional constraints to sustainably addressing issues of environmental risk resulting in poor policy coherence and congruence across levels of government; (Eriksen and Brown, 2011; Eriksen and Kelly, 2007);
- Difficulties incorporating scientific uncertainty in the policy formulation process and translating scientific knowledge into policy making (Solecki, et al., 2011; Birkmann et al., 2010; McBean and Ajibade, 2009; Henstra and McBean, 2009);
- Social issues associated with the normative behavioural and cognitive aspects of decision makers’ risk perception and decision making at multiple and interconnected levels (Wachinger and Renn, 2010; Henstra and McBean, 2005);
- Variability in adaptation planning and governance approaches to address the unique local contexts of climate change hazards and vulnerabilities, develop effective strategies to overcome socially constructed constraints, and prioritize adaptation actions that build adaptive capacity and resilience to climate change impacts occurring at the local scale (Burch and Robinson, 2011; Burton et al.,

2007; Cutter, 2006; Kelly and Adger 2000; Cohen et al., 1998; Hewitt, 1997; Blaikie et al., 1994).

Climate change adaptation decision making is further shaped by the values and cultures of organizations' institutional procedures, which intersect with individual behavioral attributes. Research and investigation into the non-climatic determinants of sensitivity and vulnerability, as well as the enabling conditions that are required for adaptation to climate change at the local level, presents ripe opportunities to investigate the institutional constraints and governance structures that influence the social context underlying municipal adaptation decision making and process outcomes (Ford and King, 2013; Inderberg and Eikeland, 2009; in Adger et al., 2009a).

Adger et al. (2009a:12) described adaptation governance as 'worthwhile yet elusive', facing complex issues of 'scale, context, understanding and interactions between different levels,'; insisting that 'uncertainty, knowledge, perceptions, goals, priorities, transparency, responsibility and accountability... [and] ensuring the common good with a view to supporting the most vulnerable' are important social factors impacting current adaptation governance across all levels. They also suggest that adaptation governance 'may entail reflexively revising and reviewing the effectiveness of current governance structures and processes, ensuring their flexibility and suitability to evolving circumstances and understandings'. Adger et al. (2009), identify reflexivity, revision and review of governance structures and processes as hallmarks of vulnerability reduction and effective adaptation governance over time.

The dynamic social norms in multi-level governance systems that can influence adaptation processes and outcomes include the formal and informal factors within vertical and horizontal governance structures and institutions such as: stakeholders' decision making practices, collaborations and formal divisions of responsibilities, as well as communications protocols and information sharing practices. As Adger (2009b: 341) contended: 'social limitations that exist within the context and processes of adaptation planning and governance are subjective social constructions, created and perpetuated by institutions and the societal practices of groups and individuals.' These social aspects of

institutional environments may contribute to the effectiveness of adaptation planning and policy making, presenting a key theme for research investigation. In addition, other unseen informal social factors related to individual perceptions, attitudes, beliefs and behaviors, may also impact or affect the adaptation planning and governance approaches that are utilized within organizations and institutions to determine climate change adaptation priorities.

In sum, there are significant opportunities and challenging barriers to achieving successful and effective climate change adaptation policy, planning and multi-level governance at the municipal scale – the focus of this dissertation – and the existing literature provides an emerging conceptual basis for conducting further applied research on the impactful social factors affecting both opportunities and limitations for municipal climate change planning (Burch and Robinson, 2011; Bizikova et al., 2011; Bizikova et al., 2008; Carter et al., 2007; Haddad, 2005; Tompkins and Adger, 2005). Case-based research into the interconnections between the governance and social context of climate change adaptation decision making at the local level provides an entry point for assessing the comparative aspects of differential approaches taken by municipal governments, and their varying process outcomes.

1.2 Adaptation in Nova Scotia municipalities

In Nova Scotia, the historically devastating impacts of Hurricane Juan in September 2003 highlighted the pressing need for better coastal adaptation policy, planning and collaboration between all levels of government. Juan killed eight people in Nova Scotia, while the province and city of Halifax endured \$200 million in damages resulting from widespread power outages, falling trees and extensive property damage to buildings, in addition to coastal infrastructure destruction and severe damages to the Halifax waterfront (ClimAdapt, 2005; Avila, 2003).

The magnitude of the hurricane's damage was such that Juan is now understood as a key 'focusing event', which drew decision making attention to the issue of climate change, and catalyzed public policy and the development of adaptation land-use planning frameworks in the city of Halifax and province of Nova Scotia (Henstra, 2012; Kingdon,

2003). Since 2003, Nova Scotia has been widely recognized as a leader in municipal climate change adaptation planning among Canadian provinces, with Halifax emerging as an climate change adaptation policy and planning leader among Canadian urban centers (HRM, 2007; Mehdi, 2006).

In 2011, Nova Scotia's climate change adaptation policy development process continued through a province-wide policy mandate requiring all municipalities to prepare and complete a mandatory 'Municipal Climate Change Action Plan' (MCCAP) by January 1, 2014 (SNSMR, 2011). This mandatory policy making process required the completion of both municipal greenhouse gas auditing and hazard, risk and vulnerability assessments as the basis for formulating municipal climate change adaptation priorities and plans for action. The MCCAP was a mandatory reporting requirement linked to the Nova Scotia Infrastructure Secretariat's gas tax multi-level funding and financial transfer to municipalities for investments in local roads, water systems and related services and infrastructure.

The shared policy environment created by the mandated MCCAP in Nova Scotia presents an excellent opportunity to comparatively analyze the social process of municipal adaptation planning in order to develop knowledge of the 'how' and 'what' social factors that enable or inhibit adaptation and resilience at the local scale, particularly in multi-level governance contexts. By developing better exploratory, descriptive, illustrative understandings of the comparative social factors that are constructive within certain municipalities or conversely that contribute to conflict, tension or inertia within others, we might mutually enhance both theoretical conceptualizations of adaptation and resilience as a social process, and generate practical knowledge and applications for adaptation policy and planning.

It is hoped that research findings will contribute to better understandings of the significance of the MCCAP as a multi-level adaptation governance policy process, by providing new insights into both the enabling conditions and the barriers for climate change adaptation planning, as currently experienced by coastal municipalities of Nova Scotia, Canada.

1.2.1 Research question

At the broadest level, the objective of this dissertation is to analyze the social dynamics of the MCCAP process in Nova Scotia, guided by the fundamental research question: *What are the social factors that impacted municipal climate change adaptation policy and planning processes in the multi-level governance context of Nova Scotia's MCCAP?*

1.2.2 Research design & dissertation format

This case-based research aims to describe and explore the social factors impacting the advancement of municipal climate change adaptation planning in a multi-level adaptation governance context. The dissertation takes an integrated-article format. Developing conceptual and applied knowledge about climate change adaptation policy and planning processes at the local level necessitates broader consideration of the social factors impacting municipal adaptation vertically and horizontally across multi-level governance adaptation policy-making scales. Through within case and across individual municipal adaptation planning case studies, analyses of the MCCAP multi-level adaptation governance process provides an excellent opportunity for utilizing mixed qualitative methods to develop new knowledge about the multi-level governance of local climate change adaptation policy and planning, and the varying roles that different levels of government play in facilitating effective and robust responses at the local scale.

Within the case and across individual cases, analysis of empirical data based on the Nova Scotia MCCAP utilizes the conceptually thematic research framework discussed in Chapter Two and the functional policy themes further constructed from cogent literatures in Chapter Three to create a descriptive, exploratory, heuristic research design for advancing both top-down and bottom-up research approaches to illustrate how prioritized social impact factors affect municipal adaptation policy and planning processes, in the municipal and broader governance context of multi-level adaptation in Nova Scotia, Canada.

Chapter Two (Research Context, Conceptual Framework, and Study Design) addresses the conceptual foundations and methodological characteristics of this PhD research and

Integrated Article dissertation. The chapter builds a research agenda for multi-level adaptation governance research by reviewing pertinent multi-level and adaptation governance literatures to illustrate conceptual and methodological themes. This Chapter creates a research context for further description of the conceptual framework, and the case study research design using mixed methods. Appendix A1 provides further argumentation related to the methodological underpinnings of the case study research design utilized in this PhD dissertation.

Chapter Three (Studying Local Climate Change Adaptation: A Heuristic Research Framework for Comparative Policy Analysis) was co-authored with Dr. Daniel Henstra (University of Waterloo, Political Science). The article reviews the existing literature on municipal adaptation comparative case studies and presents a heuristic framework and methodological approach for comparatively researching and analyzing municipal adaptation policy and planning processes. This article was published in *Global Environmental Change* in March 2015 (31:110-120).

The research approach for adaptation policy analysis is further developed and operationalized in the case study of Nova Scotia and its MCCAP approach for incentivizing municipalities' adaptation policy and planning processes. Chapter Four (Adapting to Climate Change: Local Governance, Municipal Policy and Planning in Nova Scotia, Canada) was co-authored with Dr. Gordon McBean (University of Western Ontario, Geography). The chapter preliminarily tests, utilizes and employs the functional policy themes as an experimental cross-analytic rubric for exploring, describing and preliminarily analyzing MCCAP content analysis and MCCAP focus group results to preface more in depth case study analysis. It is noted that the focus group evidence provides a baseline of primary data for iterative refinement in the online survey subsequently utilized and discussed in Chapters Five and Six.

Chapters Five and Six further develop the conceptual research framework proposed in Chapter Two and the functional policy themes elaborated on and discussed in Chapter Three to further provide illustrative case study depth and context using exploratory, descriptive within MCCAP, individual municipal case study analysis of Nova Scotia's

adaptation planning processes in three purposively selected municipalities (e.g., Amherst, Bridgewater and Shelburne). These chapters thematically cross-examine and synthesize research results under the three conceptual themes of: i) municipal adaptation policy initiation; ii) municipal adaptive capacity-building processes; and, iii) adaptation policy integration at the individual case level of municipal adaptation planning processes. Aggregated prioritized opinion trends about social impact factors were produced in a 2015 provincial online survey of Nova Scotia municipal adaptation planning stakeholders that iteratively built upon and tested the 2014 focus group findings described in Chapter Four. This iterative research approach narrowed the analytic scope for illustrating how impactful social factors of interest manifest in cases of municipal adaptation planning. Finally, Chapter Seven synthesizes research findings to offer conclusions and recommendations based upon this work. These sole authored Chapters are not yet submitted for publication.

1.3 Summary

The integrated aim of this dissertation is to offer case study analyses of multi-level adaptation governance that explores and describes what and how impactful social factors affect municipal climate change adaptation planning processes at the local scale in Nova Scotian municipalities, in the broader context of the MCCAP multi-level adaptation governance framework. Using Nova Scotia's unique MCCAP multi-level adaptation governance policy making case study environment, provides the basis for conducting municipally focused adaptation policy research and investigation, using trial tests of mixed methods to advance concepts based on iterative analyses of empirical case evidence. The research design used in this study offers a multi-stakeholder, exploratory, descriptive comparative case study approach for investigating the social factors impacting municipal and provincial adaptation policy-making processes. Research findings may present pragmatic opportunities for continued conceptual and applied development of planning, policy-making and practices conducive to better enabling municipal adaptation in Nova Scotia, Canada as well as multi-level adaptation governance contexts more broadly.

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Chapter Two

2 Research Context, Conceptual Framework and Study Design

2.1 Introduction

This chapter provides the background research context, conceptual framework and design for this study. The chapter begins by elaborating on the specific research context of this study about municipal adaptation planning and policy-making in Nova Scotia, Canada. The Nova Scotia ‘Municipal Climate Change Action Planning’ (MCCAP) case provides an example of a unique and interesting adaptation policy and planning multi-level governance framework. After describing the research context, the chapter reviews conceptual and methodological literature used to construct the conceptual framework and case study methodology for this study. This provides an overview of the research design for studying processes multi-level adaptation governance, in the case of Nova Scotian municipalities (See: Operational Definitions - Pp.xv-xvii).

This chapter focuses on developing a study design and methods to identify and understand social factors impacting municipal adaptation within the broader social contexts of multi-level ‘adaptation’ governance. Research opportunities to advance conceptual and applied understanding of the ‘structural governance context’ of local adaptation policy-making, uses the ‘diagnostic entry point’ of municipal stakeholders’ views and perspectives to develop knowledge of the barriers and opportunities available for local adaptation and adaptive capacity building (Moser, 2009; Engle, 2007).

This study targets municipal land use planners and municipal stakeholders and non-municipal officials involved with MCCAP Nova Scotia, Canada. Case study analysis uses data from interviews, an online survey, focus groups and content analysis of Nova Scotia MCCAP documents. The main objective is to determine impactful social factors that contribute to initiating adaptation, building adaptation capacity and integrating adaptation at the municipal scale, in a multi-level adaptation governance context.

This case study analysis is exploratory and descriptive, using three individual cases of municipal adaptation planning within the larger MCCAP context to illustrate how social factors impact municipal adaptation planning and policy development. Exploratory, descriptive case studies are a prelude to more rigorous social research in areas of nascent social phenomena, while also contributing to the development of descriptive theories of social phenomena (Yin, 2003). As a result of this research design, the policy findings of this analysis are equivocal and suggestive (Rutman, 1984; Froman, 1968).

Developing formative conceptualizations about adaptation policy making functions provides an inductive, purposive approach to social data and research discovery, serving as a useful research tool for bridging the gap between conceptual and empirical work by providing a means for generating insights into the causal relationships of new social phenomena. Rutman (1984:69) characterized formative research as a useful approach for program development and policy evaluation by ‘affording a learning opportunity with research used as a tool for collecting data to assist in the conceptualization and operationalization of a program, its goals, effects and assumed causal relationships’. This research approach is grounded empirically and incrementally contributive to methodological and theory development about multi-level adaptation governance through the production of equivocal and suggestive findings related to the social factors affecting the multi-level governance conditions that can support municipal adaptation planning.

This design choice reflects the nascent topic and research needs for continued documentation of adaptation governance approaches and planning processes as nascent social phenomena in need of theory development (Biesbroek et al., 2010). The related development of adaptation case study research methods (Murtinho and Hayes, 2012) offers an opportunity for methodological innovation to identify how social factors comparatively impact local adaptation in broader governance contexts (Porter et al., 2015) and at the local scale (Vogel and Henstra, 2015).

This case study considers how municipal adaptation planning processes are impacted by social factors within multi-level governance contexts (Corfee-Morlot et al., 2009). Schmitt (2013) discusses how comparatively identifying similarities and differences in

policy-making choices within and across cases can lead to enhancing applied, conceptual and theoretical knowledge. Gupta (2007, 2012) suggests that comparatively determining social factors contributive to variations in social phenomena serves as foundational aspect of grounded theory building. Rose (2005) adds that there is applied and instrumental value of the findings and recommendations of case studies' for improving planning, policy and decision-making options.

2.2 Research context

2.2.1 Project Overview

The research question guiding this PhD study is: What are the social factors that impacted municipal climate change adaptation policy and planning processes in the multi-level governance context of Nova Scotia's MCCAP? The unit of analysis in this study is multi-level adaptation governance. The case study specifically considers the subject of Nova Scotia MCCAP and its unique municipal adaptation policy-making process.

In this case, the provincial Department of Municipal Affairs presided over monetarily incentivizing municipalities to complete mandatory climate change action plans. These plans required climate change vulnerability assessments, hazard and risk prioritization processes and the development of adaptation policy actions. The MCCAP was exclusively used in Nova Scotia as mandatory reporting requirement for continuing the transfer of federal gas tax funding, to fund municipal infrastructure maintenance and development (SNSMR, 2011). The plans also included mandatory greenhouse gas auditing, however this falls beyond the scope of research, in this adaptation case study.

This research study occurred under the broader auspices of the Marine Environmental Observation Prediction and Response Network chaired in the Department of Oceanography at Dalhousie University, in Halifax, Nova Scotia (See Figure One).

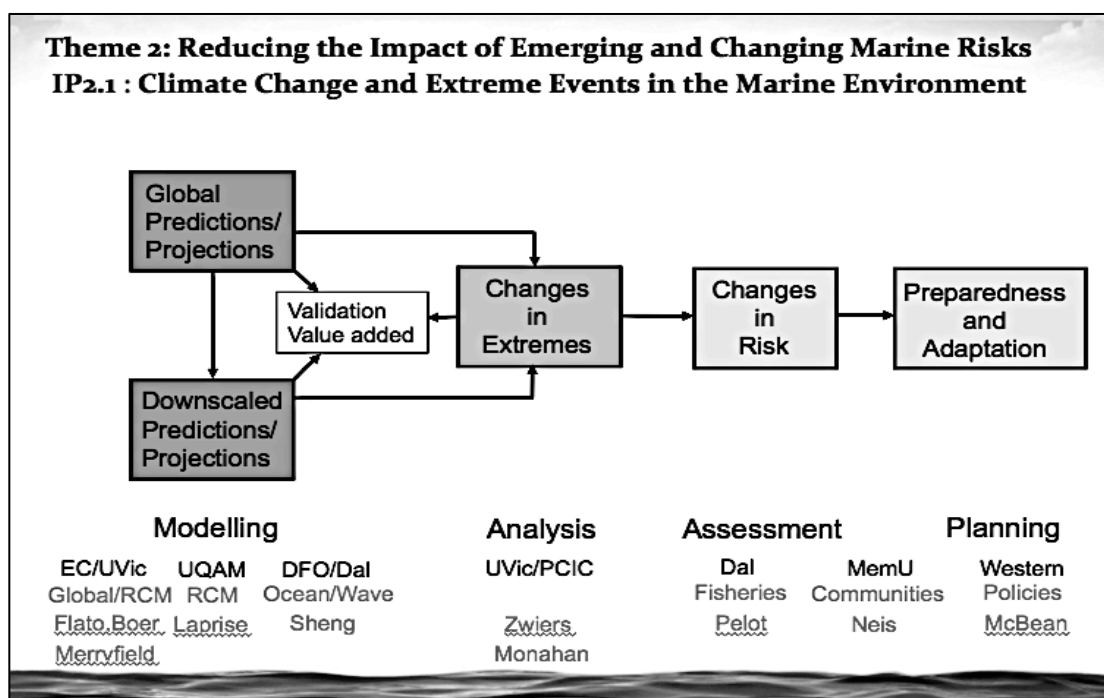


Figure 1: MEOPAR Theme 2.1 - Adaptation policy and planning for reducing the impacts of climate change extremes in the coastal zone

The overall objective of the study is to improve and increase knowledge about social factors impacting municipal adaptation policy and planning in multi-level governance contexts. To these ends, a core objective is to develop a method for using individual case studies to provide illustrative comparison of social factors impacting municipal adaptation processes within the MCCAP governance framework. The method developed for use seeks to provide knowledge and insight about what social factors impact municipal adaptation policy and planning in a multi-level governance context. In so doing, the study draws broader attention to social factors impacting municipal adaptation policy and planning in multi-level governance contexts through illustrative depth context, and insights derived from comparing empirical evidence to conceptual literature.

Nova Scotia's MCCAP case presents two opportunities for innovative research. First, the study provides an opportunity for documenting a multi-level governance framework for municipal adaptation processes that helps to address research gaps related to a lack of documented multi-level adaptation governance case examples (IPCC, 2014; Fussel and

Klein, 2006). The MCCAP provides a specific case and example of multi-level adaptation governance. For this reason, it is deserving of scholarly documentation and analysis.

Secondly, the MCCAP case study provides an opportunity to address issues related to comparative case study research designs and methods used to identify patterns, similarities and differences between adaptation policy making and planning cases (Dupuis and Biesbroek, 2013; Murtinho and Hayes, 2012). Within this case, the provincial MCCAP policy mandate provides a quasi-independent, explanatory variable for the initiation of municipal adaptation policy and planning in the Canadian multi-level adaptation governance context. This policy attribute allows for greater comparability of the social factors impacting municipal adaptation planning within the MCCAP case, particularly at the individual municipal case level.

The research design for this study uses aggregate data collected from content analysis, focus groups and an iterative online survey to categorically narrow the analytic scope of impactful social factors for individual case analysis of municipal adaptation planning processes. These factors are comparatively illustrated at the individual case level across three municipalities (e.g., Amherst, Bridgewater, Shelburne). The purpose of using individual cases within the MCCAP is to provide illustrative depth and individual case context to aggregate breadth MCCAP case data that developed priorities for illustration at the individual case level. MCCAP individual cases provide an illustrative research opportunity for comparing and contrasting social factors impacting municipal adaptation policy and planning. MCCAP individual cases also provide detailed documentation contributive to ripening conceptual understandings of the social context of municipal adaptation policy making and planning in multi-level governance systems, which is contributive to adaptation policy making theory development. The individual case comparative approach, offers a ‘bottom-up’ opportunity for documenting and analyzing social processes of adaptation planning at the local scale, from the perspectives of both municipal and non-municipal adaptation policy and planning stakeholders, in a broader multi-level governance context.

Differential policy power, resource distribution, agenda setting and policy responsibility and jurisdiction are hallmarks of multi-level governance in Canadian institutions of tripartite government (Horak, 2012). These overarching multi-level governance concepts provide an important bridge between multi-level governance and adaptation literature. Adaptation case studies have documented the key roles for multi-level governance and climate change policy frameworks to contribute to initiating and sustaining municipal climate change adaptation efforts to reduce climate change risks and support adaptation at the local scale (e.g., Porter et al., 2015; Hanna et al., 2014; Schaufli, 2014; Ford and King, 2013; Dickinson and Burton, 2011; Corfee-Molot et al., 2009). Other studies indicate how social factors impact climate change adaptation planning horizontally across municipalities and vertically in multi-level governance institutional contexts (Ekstrom and Moser, 2013; Moser, 2009).

Multi-level governance themes are a central research foci of this adaptation case study analysis, providing opportunities for considering the social factors impacting adaptation policy initiation, capacity building and integration at the municipal scale in the Canadian multi-level governance context of the Nova Scotia MCCAP adaptation governance case.

2.2.2 MCCAP: Background research context

Since the national ‘New Deal for Cities and Towns’ (2005), the federal gas tax has transferred to Canadian provinces the excise tax revenues collected from the sale of gasoline. This ‘gas tax’ multi-level funding mechanism has provided a stable stream of funding for Canadian provinces to re-distribute to municipalities’ for investments in infrastructure maintenance and development in transportation, water, waste-water, energy and other infrastructure projects and activities that contribute to ‘clean air, clean water and a healthy environment’ (SNSMR, 2011). The first phase of the national gas tax agreement concluded in 2010. The first phase used as the gas tax as a policy lever and monetary incentive to secure the mandatory completion of municipal Integrated Community Sustainability Plans (ICSPs), across all of the country’s municipalities (Connelly et al., 2009). This was a provincially administered process in response to a national policy mandate that conditionally required municipal sustainability planning to be completed in order to continue to receive eligible gas tax funding.

However, under the re-negotiated terms of the second phase of the gas tax transfer agreement between the province of Nova Scotia and the Government of Canada, Nova Scotia municipalities' were further mandated to complete 'MCCAPs' by 2014 (SNSMR, 2011; Appendix B1). Nova Scotia is the only province in Canada to have adopted this MCCAP/gas tax mandatory reporting requirement approach that was responsible for the discretionary administration of more than four years (2010-2014) of provincial-municipal federal gas tax infrastructure funding, in excess of 223 million dollars. In order to remain eligible for this funding, municipalities were required to complete MCCAPs or face the risk of losing the valuable funding transfer.

In the MCCAP case, cross-provincial horizontal policy comparisons are hindered by the fact that Nova Scotia is the only province in Canada to have adopted this unique multi-level approach to mandating municipal adaptation planning. However, the unique case study environment of a quasi-independent variable for adaptation planning initiation (e.g. MCCAP gas tax mandate) overcomes conceptual issues associated with conducting comparative within case, municipal analysis due to attribution of social causality. In the case of a substantial, intentional and concrete multi-level adaptation governance framework, the opportunity is provided for conducting within case analysis of individual municipal adaptation planning to explore and describe what initiates, capacitates and aids with the integration of adaptation at the local scale. While the scope of this research is predominantly bounded to an investigation of the municipal-provincial context of the Nova Scotia MCCAP, across case comparisons with other adaptation cases in the developed world are more globally explored and described throughout the discussion (Biesbroek, 2010; Haddad, 2005).

It is proposed in this study that the province of Nova Scotia MCCAP gas tax policy mandate was responsible for initiating the widespread development of municipal adaptation plans. There was widespread municipal compliance with the MCCAP policy mandate because non-compliance meant municipalities could lose the valuable gas tax infrastructure revenue stream administered by the province. If municipalities did not comply with the provincial mandate to complete the MCCAP then as a consequence they faced the risk of losing the provincially delegated, federal gas tax funding they were

accustomed to. By leveraging the gas tax, the province leveraged an existing financial incentive to motivate Nova Scotia municipalities to undertake climate change adaptation planning, and in so doing, successfully implemented Canada's first comprehensive multi-level adaptation governance policy framework.

This case study explores and describes how the municipal impact of the MCCAP multi-level adaptation governance framework was an instrumental social factor leading to the initiation of municipal adaptation policy-making processes in Nova Scotia municipalities. Documenting the MCCAP case through qualitative research contributes to existing knowledge of how differential policy power, agenda setting and resource distribution can be impactful social factors in multi-level governance contexts for initiating climate change policies and plans at the local scale (Horak, 2012; Corfee-Morlot et al., 2009).

2.3 Multi-level climate change governance: A conceptual framework

Understanding how central governments and public and private stakeholders interact to design and implement policies at various scales of action are the central features of multi-level governance research (Hooghe and Marks, 2003). Vertical and horizontal governance relationships are widely recognized as key means for improving coherent, congruent policy domains. In the realm of climate change adaptation policy development, this includes federal, provincial and municipal institutional stakeholder cooperation and coordination through integrated policy frameworks (Dickinson and Burton, 2011; Burton et al., 2007; Burton et al., 2002). A key goal of multi-level climate governance is to contribute to collaborative, collective advancement of climate change public policy agendas and integrated actions and implementations on common priorities such as reducing greenhouse gases and adapting to climate change impacts (Corfee-Molot et al., *'Cities, Climate Change and Multi-level Governance'*, 2009).

Overall, Corfee Morlot et al., (2009: 27) suggests that there are three questions worthy of examination in the case analysis of municipal scale climate practices and actions in multi-level governance contexts:

1. How does climate policy making play out locally and horizontally? Is it working well, and if so, why?
2. What vertical governance approaches linking higher government policy to local mitigation and adaptation actions exist? What are key institutional models, and within these, what is ‘good practice’?
3. What tools are key for ‘good’ multilevel climate change governance? Are they in place? Do they support cost-effective local decision making on climate change? If not, what is needed to ensure appropriate tools are in place?

In the case of the Nova Scotia MCCAP case study, the municipal adaptation policy mandate provides insight towards addressing the second question, while opening a door for exploring the first and describing the third. The MCCAP case study provides an arena for investigating how climate policy making plays out locally in multi-level governance contexts, while documenting how and what social factors impact the adaptation policy making process. The research contributes to improving documentation, knowledge production and analytic assessment of an existing example of an institutional adaptation policy framework, to further explore and describe the factors that socially impact municipal adaptation in multi-level adaptation governance contexts.

Since adaptation is a responsibility shared between the federal, provincial and municipal governments, scholars have adopted a multilevel governance lens to examine case studies of climate policy (e.g., Jones, 2012; Birkmann, 2010). However, there is a need for flexible conceptualization of the multi-level governance system and social context of coordinating climate change policy actions. This is due to the fact that multi-level adaptation governance is a complex social system involving many institutional layers and policy stakeholders. Developing coherent climate change policy approaches and responses to both mitigate greenhouse gases and adapt to inevitable impacts necessitates flexible conceptualization of a complex social landscape and the porous social boundaries of multi-level adaptation governance cases.

Corfee Morlot et al., conceptualize horizontal and vertical linkages between levels of government (national, sub-national, regional, provincial, municipal) as influential factors affecting the scope for decision-making when establishing priorities and actions for climate change (See also: Moser, 2009). As Corfee Morlot et al. (2009) note, whereas policy concerning the reduction of greenhouse gas emissions is largely a national and international matter, adaptation is most appropriately governed at local and regional scales. This cross-scalar policy making connectivity indicates that it is ‘increasingly evident that regional and local decisions are essential in the design and implementation of mitigation and adaptation strategies to respond’ (24). Cross-scale, multi-level governance social landscapes include a wide range of potentially impactful social factors – from macro governance structures to micro social dynamics. The wide range of potential social factors underscores the need for flexible conceptualization of cases of multi-level adaptation governance and research aimed at determining the social factors impacting climate adaptation policy at the local scale.

The wide variance of potentially impactful social factors contextually and conditionally illustrates the affect that place-based differences in capacity, knowledge, values and cultural differences can have on the development of layered social contexts of climate change decision-making, and the related planning and policy-making social processes prefacing climate governance interventions and actions. Within case attention to the social context and histories of vertical and horizontal institutional relationships provides a critical research frame for developing place-based conceptualizations of the social landscapes underlying multi-level adaptation governance contexts. Therefore, conceptualizing the social landscape of vertical and horizontal institutional contexts within a multi-level adaptation governance system, pre-requisites a critical research design.

Corfee Morlot et al., (2009) provide the useful example of a conceptual multilevel climate governance framework where higher government climate change strategies require local implementation through multi-stakeholder collaborations. However, local capacities for implementation are ‘nested’ within existing legal and institutional frameworks that hierarchically limit the jurisdictional scope of local decision-making and

available policy and planning options for coordinating actions. Corfee Morlot et al., suggest that because of this complex, multi-level inter-dependency, ‘action at local scale may enable or constrain what is possible nationally and vice versa, highlighting a two-way relationship between local and national action on climate change’ (2009:25).

Much of the complex *vertical* relationship between local governments and higher levels on matters of climate policy relates to issues of municipal adaptive capacity and specifically municipal abilities to access higher-level funding and resources in order to address and respond to climate change effectively at the contextually relevant scale of local governments. This specific area of research provides ripe opportunities for exploratory, descriptive case study analysis to identify how and what social factors impact, enable and constrain local adaptation stakeholders’ strategic climate change planning and implementation processes within this larger multi-level governance context.

Exploring and describing the relational social dynamics of *horizontal* governance stakeholders, within vertical governance structures, also conceptually offers a rich and diverse social landscape of policy-actors operating and interacting within broader structural and institutional contexts. Sub-national actors (e.g., provinces, municipalities) horizontally interacting with each other and with other non-governmental actors can affect the policy-making agenda and priorities at this scale. These conceptual relationships exemplify the need for flexible conceptual boundaries when investigating the ‘who’ ‘how’ and ‘what’ of early attempts to craft climate adaptation policy-processes and responses in case settings of multi-level governance (Aall, 2012; Aall et al., 2007).

A central conceptual issue facing governance coordination is the modern fragmentation of multi-level governance contexts undermining the capacity for strategic policy and planning implementation to occur at local municipal or urban scales (Corfee Morlot et al., 2009; OECD, 2006). In this resource vacuum, horizontal actions (e.g., inter-municipal collaboration) are often mobilized to coordinate and leverage responses through shared planning and policy-making approaches. Another horizontal governance attribute is the need, within levels and across institutions, for inter-departmental horizontal collaboration and coordination to ensure policy coherence; exemplifying a complex social feature of

the cross cutting and diversely issues-based and place-contextual nature of implementing climate change policy and planning in multi-level governance contexts. Horizontal collaborations offer a ripe area of conceptual inquiry for the study of adaptation policy making and planning.

Across all governance levels, but noting of hierarchal positions, institutional autonomy to set policy agendas and construct priorities through stakeholder collaborations and dialogue exhibits a social policy making processes of ‘...deliberative exchange [where] social norms may evolve... this can make it possible to garner... [political] policy support for policy reforms and actions’ (Corfee-Morlot et al., 2009:26). In other words, social processes and context can create the ‘norms’ and social landscapes by which political support for climate change actions can be advanced, or conversely detracted. The relationships between staff and councils in adaptation planning and policy making at the local scale offers a ripe object for description and exploration to determine how and what social factors influence the saliency of adaptation as a policy-making priority at the local political level.

Complex social inter-dependencies of climate change policy-making necessitates conceptualization of the cross-scalar nature of stakeholder collaboration and co-operation as the ‘... lessons and experiences with adaptation at the local level must feed into higher levels of decision making to make sure that local strategies remain relevant and appropriate, and provide a basis for transferring knowledge to other sectors and communities’ (Corfee-Morlot et al., 2009: 26). This plausibly includes through communications, institutional innovation and policy experimentation, with the meaningful participation of local scale actors in policy option formulation and prioritization, in order to achieve locally grounded and more broadly contributive climate change policy goals and objectives. The social factors impacting municipal abilities to implement local adaptation plans in multi-level governance contexts deserve further research and analysis.

Corfee-Morlot et al., (2009) discuss how local governments’ limited authority, jurisdiction, resources and capacity in the broader context of responding to climate

change raises broader social issues of national political leadership capacities for vertically setting the climate change policy agenda (See also: Biesbroek et al., 2010). It is conceptualized that national political leadership can directly or indirectly limit or enhance the scope of local policy preferences and opportunities. Political dimensions of multi-level governance can materially determine how and what the policy options available for local governments are, through determining how and what coordinated institutional policy frameworks for the vertical governance of climate change develop, exist and/or are implemented. Using cross-sectoral policy making approaches across all levels of government to encourage policy coherence, congruence and adaptation integration into multi-level governance systems is conceptualized as contributive to local adaptive capacity building. Further research exploration and description of the local-national interconnectivities are thus deserving of further analytic attention in adaptation case studies. Corfee Morlot et al., also suggest that defining principles of good practice of multi-level climate governance can draw from related environmental and development-planning literatures to construct a conceptual framework for assessing and evaluating multi-level governance cases of climate change policy-making processes (see Table One).

Suggested 'good practices' and principles for multi-level climate governance (Corfee-Morlot et al., 2009)	
Frameworks for policy and planning broadly reflecting local stakeholders policy preferences through engagement and participation;	Addressing inequities in resource distribution through policy-making approaches to improving decision-making and access to information;
Policy and planning that assesses and responds to both the short-term and long-term opportunities and constraints facing climate policy implementation	Supporting long-term planning designs capable of overcoming political cycles in order to sustainably embody longer term climate goals and social transformations
Policy and planning outcomes that lead to cost-effective actions through the use of a mix of instruments to reduce costs and maximize efficient benefits for local scale climate policy implementation	Ensuring vertical policy coherence and horizontal policy congruence through stakeholder collaborations to proactively align and improve adaptation policy integration and in order to synergistically develop policy priorities and actions
Governance hierarchies that utilize multi-level leverage to create opportunities for local incentives for climate policy innovation, with lessons drawn to improve local and broader policy frameworks	Maintaining accountability for policy implementation through assessment and monitoring to ensure policy progress and success.

Table 1: Suggested 'good practices' and principles for multi-level climate mitigation and adaptation governance (Corfee-Morlot et al., 2009)

Corfee Morlot et al., discuss how 'good practices' can be used to conduct *evaluations* of multi-level climate change governance using these principled dimensions to assess: i)

levels of participation; ii) the provision of a strong analytic foundation to guide decision-makers' planning; iii) maximizing cost-effective and economically efficient solutions; iv) encouraging experimental policy innovation; v) addressing inequities in resource distribution and procedural aspects of governance; vi) looking to establish long term planning horizons; vii) contributing to the development and delivery of multi-level policy coherence; including via; viii) monitoring, reporting and evaluation as elements of adaptation policy practice. These principles and practices are conceptually considered in the exploratory, descriptive analysis of the MCCAP in Nova Scotia.

The framework utilized by Corfee-Morlot et al., (2009) provides a solid conceptual foundation for further theoretical development and discussion in this study under three overarching conceptual policy making themes of: i) local adaptation policy and planning initiation in multi-level governance contexts; ii) local adaptation capacity building in multi-level governance contexts; and iii) the integration of local adaptation policy and planning in multi-level governance contexts.

A brief literature review now further builds a research agenda for conducting multi-level adaptation governance research using exploratory, descriptive case study techniques to advance qualitative mixed methods of case study analysis of municipal adaptation planning processes in multi-level governance contexts.

2.3.1 Literature review: multi-level governance and local adaptation policy and planning

Multi-level governance case studies offer both methods and means for the comparison of policy objects (e.g. goals, objectives) contained in empirical materials such as policy documents, and, through the analysis of primary data collected through representative interviews with various levels of government stakeholders. Within this broader multi-level governance research context of adaptation policy and planning processes, regional, provincial and municipal adaptation policy-making and planning initiatives provide a distinct and bounded subject of research for case-based policy analysis (Murtinho and Hayes, 2012; Corfee Morlot et al., 2009).

Multi-level governance conceptually refers to multi-nodal governance processes of planning and policy-making that occur across and within various levels of government. Young (2012:4) points to Hooghe and Marks (2003) conceptualizations of multi-level governance as “...durable jurisdictions’ with non-intersecting memberships, at a limited numbers of levels, that deliver many services (e.g. tri-partite federalism characterized by municipal, provincial and federal government levels)’. A second definition refers to multi-level governance as ‘...functionally specific jurisdictions, intersecting memberships, involving many levels and flexible architecture (e.g. special purpose districts, trans-border authorities)’ (4).

Young (2012:5-6) further contends that in both instances, multi-level governance policy-making approaches encounter the challenge of coordinating and financing activities of several levels of government. This governance process presents challenges and opportunities for policy design and implementation that involve, in broad terms, ‘inter-governmental relations and social forces’, with the implicit recognition that in countries such as Canada:

...Provinces have complete constitutional authority over their municipalities’ and multi-level governance research is primarily concerned with how governments (including federal, provincial and municipal institutions, agencies and authorities) at various levels interact in policy-making processes, including through the involvement of ‘social forces’ and non-governmental actors in the governance process.

Horak (2012) further observes that there is widespread scholarly agreement that multi-level governance occurs when fragmented power is shared between autonomous agents (both within and outside of government systems) who necessarily must engage in shared policy-making activities in order to achieve common or differentiated policy goals. Horak cites Jessop (2004) who noted that multi-level governance conceptually involves ‘mechanisms and strategies of coordination adopted in the face of complex, reciprocal interdependence among operationally autonomous actors’ (2012:229). However, Horak observes further that in contexts of multi-level governance ‘... coordinating the policy power and agendas of various agents is often a very complex undertaking, and it does not always succeed’.

Municipalities are on frontlines of climate impacts and have the potential to mitigate climate risks. Local adaptation planning and climate policy-making actions could reduce vulnerability at the local scale where, for example, the climate change damages associated with storms, surges and sea level rise manifest. However, municipalities in the broader Canadian context of multi-level governance are constrained.

Craft and Howlett (2013) point to the powerful, political constraining factors of constitutional and jurisdictional structures, policy legacies and network positions as hindrances to effective cross-scale governmental action capable of leading to the institutionalization of climate change adaptation as a policy domain for multi-level governance. Canada's decade of darkness (2005-2015) of meaningful national political leadership or action on climate change is possibly a contributive factor to the sub-national emergence of provincial and regional climate change policy developments, such as MCCAP (CCPA, 2015; SCD, 2015; SNSMR, 2011).

The findings of earlier climate governance literatures, such as Bulkeley and Betsill (2003, 2005), contended that multilevel governance perspectives on issues such as climate change governance problematically opens a Pandora's box of issues challenging traditional conceptualizations of environmental politics and the interplay of different levels of policy-making and political decision-making occurring in isolation with '...little questioning of the geographical imaginations which underpin the idea of nested and discrete scales of political authority over the environment' (43). Bulkeley and Betsill argue that multi-level governance policy-making and cognitive 'silos' posed a key social factor limiting local adaptation efforts, particularly given the paucity of political space (sphere of authority) delegated to local governments to pragmatically tackle complex issues such as climate change adaptation. This points to the importance of vertical collaboration and congruence in multi-level climate change governance contexts (Corfee Morlot et al., 2009), to ensure that the 'geographic imagination' (Bulkeley and Betsill, 2005) underpinning climate change adaptation and mitigation policies is aligned in national and sub-national policy agendas and mechanisms.

Research considerations related to the allocation of decision-making authority and material resources (conceptualized as ‘policy power’) and the compatibility and coordination between levels of government (conceptualized as ‘policy agendas’) are identified by Horak as two conceptually important aspects of policy analysis of multi-level governance initiatives. Corfee Morlot et al., (2009) further identify five distinct conceptual stages of the policy process as conceptual framings for multi-level governance policy research including: i) agenda-setting; ii) policy formulation and approval; iii) implementation; iv) feedback evaluation; and, v) the dissemination and replication of ideas and policy frameworks.

The conceptual framework for studying multi-level adaptation governance synthesizes these related conceptual framings to suggest that local adaptation policy initiation is related to the critical pre-conditionality of resource distribution and agenda setting in multi-level governance contexts. Further, adaptation capacity building and integration at the local scale conceptually encounters issues of having enough policy power to act. Issues related to conflicting jurisdictions, policy coordination and differential access to resources may hinder adaptation integration and capacity building (Schauffler, 2014) and this may relate to the strength of provincial policies (Hanna et al., 2014). The fact that while multi-level governance incentives may lead to initiating and developing local agendas and priorities for adaptation policy implementation; in the absence of broader sustained support, the abilities of municipalities to implement policy actions are constrained by cross-jurisdictional issues of policy domain and lack of resources to address place-based contexts of climate change risk and vulnerability through incremental adaptation approaches (Bizikova et al., 2008).

Horak (2012) suggests that multi-level governance case study research designs focus on ‘the nature of the coordination problem, and how agents address it’ in order to assess and explain qualitative variations in policy across cases. Given the nascent nature of the multi-level adaptation governance cases such as MCCAP, this research exclusively focuses on how the provincially led MCCAP multi-level adaptation governance case delegated policy power and set the adaptation agenda for municipal adaptation policy formulation (e.g., initiation and capacity-building). The case illustrates and explains the

‘how’ and ‘what’ of the social process of adaptation policy making at the municipal level, in a multi-level governance context. The MCCAP case plausibly contributes to informing the conceptual and applied aspects of adaptation policy and planning implementation and integration, while offering conceptual insights for future case studies and adaptation policy analysis.

In the complex social contexts of municipal climate adaptation, there is a need for constructing research approaches and methodological designs that give analytic recognition and pragmatic clarity to the multi-level governance contexts of vertical integration and horizontal collaboration that affect adaptation policy making and implementation at the local scale. Identifying social factors and conditions that impact the coordination of multi-level governance adaptation policy agendas in empirical cases, may contribute to overcoming social limitations that adaptation stakeholders face across scales (Adger et al., 2009).

2.3.2 Multi-level adaptation governance: Practices, conceptual developments and research issues related to conducting case study analysis of local adaptation planning and policy-making

The IPCC (2014) has found that adaptation is transitioning from a general awareness to the more specific development of strategies and plans in societies, with national governments playing key roles in adaptation planning and implementation. However, subnational and local level adaptation responses and outcomes have been diverse and varied. In this context, the IPCC has found that multi-level institutional coordination between governance levels is a crucial dimension for promoting adaptation planning and implementation. The IPCC reports that there are both top-down and bottom-up opportunities for sector-based adaptation that currently exist or are occurring in diverse policy and planning areas such as: i) infrastructure and asset development; ii) technological process optimization; iii) institutional and behavioral change or reinforcement; iv) integrated natural resources management (watersheds, coastal zones); as well as in, v) financial services (risk transfer) and/or, vi) early-warning information systems. All sector-based interventions are geared at supporting proactive adaptation

planning strategies to identify and address place-based needs and vulnerabilities, with respect to contextual climate change hazards and impacts.

In Canadian municipalities, the recent findings of the National Municipal Adaptation Project (Hanna et al., 2014) verify the IPCC's findings by reporting that there is considerable variability in the level of municipal sectorial engagement in adaptation planning in Canada, and the extent to which communities are engaged in adaptation may relate to the strength of provincial policies, funding and support. The survey of 481 municipalities from across Canada also found that support and leadership from planners, other municipal staff and local politicians were important factors for advancing adaptation planning at the local level. Other findings of this study indicated that there was a high degree of variability in municipalities' abilities to determine the contextualized, local scale risks and hazard conditions that are associated with climate change.

The Gulf of Maine Council on the Marine Environment similarly found in a survey of 33 Canadian and American municipalities in the Bay of Fundy region that key constraining factors on municipal climate change impact preparedness included: lack of resources, lack of public concern and political will, and a desire for local efforts to be supported by higher levels of government in order to accelerate local adaptation efforts (Schauffler 2014).

In a comparative adaptation case study, Jones (2012) has argued that multi-governance resource provision and improving intergovernmental relationships and institutional mechanisms for the governance of climate change adaptation at the local scale are important cross-scalar aspects of adaptation policy and planning. The study provides an example of a comparative adaptation case study analysis of the contextual factors inherent in the institutional multi-level governance contexts of Vancouver, Canada and Melbourne, Australia. Jones (2012) utilized a conceptual adaptation policy framework developed by the OECD (2006) in order to analyze cooperation between different levels of governments in multilevel systems with respect to implementing climate change policies. The study explored the social impact factors that encourage or discourage cooperation in climate change policy making in multi-level governance systems.

The study compared federal systems of governance (Canada, Australia) and two urban municipalities (Melbourne, Vancouver) capacities for taking action on climate change. The study found that municipal capacities were constrained by hierarchal factors of policy jurisdiction and lack of clarity with respect to the roles and responsibilities for different levels of government to deal with complex, multi-dimensional issues such as climate change. As a result, Jones argued that municipalities' climate change actions and measures were 'largely symbolic' and limited in scope, due to the wider policy incongruities. Jones (2012:1243) argued that the lack of multi-level cooperation and coordination on climate change necessitates '...a shift to more effective regulatory climate change frameworks' which in turn depends on improving intergovernmental relationships and institutional mechanisms for the governance of climate change. Jones has argued that this policy-making shift recognizes the importance of empowering local government to act on climate change issues within systems of multi-level governance via greater resource provision and policy coordination that prioritizes climate change actions at the local scale.

Based on this analysis, Jones has broadly argued that, in multi-level governance systems, designating policy jurisdiction, legislative capacity, resource allocation and monitoring responsibilities, pragmatically can determine the boundaries of decision-making; highlighting the need for clarifying the different roles and responsibilities of levels of government, and the scope for cross-scale cooperation between levels of government on matters of climate change action. These factors are particularly impactful on stakeholders' capacities for action at the local scale, indicating that advancing local capacities for climate action relates in large part to multi-level governance coordination.

In another case study of local climate change policy development, Bassett and Shandas (2010) identified that, in the absence of multi-level governance policy mandates, there is empirically a great diversity in the impetus for local climate change action planning (mitigation and adaptation) and policy developments. High variance in details, methods and motivations driving the local policy-making process are reported across cases. These analysts posited that two models for climate change policy innovation were determinable through case-based research into American cities' climate change plans.

Bassett and Shandas first proposed that autonomous, internal determinants of local climate policy innovations were based on decision-maker's key normative values, beliefs and knowledge of climate change and understandings of global scale inter-connectivity to localities'. These social aspects, they have argued, play important roles in determining the scope and nature of autonomous, local scale actions while also serving as a contributing factor for local scale climate change planning and policy innovation success. This climate change policy-development model could plausibly be referred to as the 'catalytic champion' or embedded 'change agent' model whereby key agents in positions of decision-making authority act as policy entrepreneurs for the advancement of local climate policies and actions (see also Krause, 2012 and Roberts, 2010). These factors are deserving of greater analytic attention in adaptation case studies.

In contrast, Bassett and Shandas observed another model of policy-development whereby regional scale diffusion of policy innovations served as an explanatory 'causal mechanism' for the initiation of local climate policies. They observed that 'copycat behavior occurred across governments' reflecting that regional scale policy entrepreneurship and social networks act as horizontally affective social factors catalyzing the broader uptake of policy innovations related to local scale climate action across municipalities. In other words, as one local government may have autonomously led the development of climate change initiatives, other governments in observing its social value, 'followed the leader' and sought to replicate what were seen as socially beneficial processes of local climate change policy development.

Whether local climate change policies are initiated by autonomous, entrepreneurial leadership actions, replication behaviors or incentive based multi-level governance structures, the IPCC (2014) has found that complex, diverse and context dependent factors inform adaptation responses in sector and place-based approaches. Adaptation responses can variously involve both combinations of top-down and bottom-up strategic planning approaches. Depending on the context, the IPCC reports that stakeholders have employed a variety of tools and resources for adaptation planning and implementation involving such activities as the consolidation of organizational and sector-based risk information and knowledge, often through multi-disciplinary efforts to assess and

communicate climate risk information, or by developing and diffusing of adaptive technological and management practices.

The IPCC (2014) reports that adaptation planning and implementation is a social process that often involves iterative vulnerability and risk assessments conducted through flexible and adaptive planning mechanisms. A key attribute of the iterative adaptation process is to advance organizational learning by enhancing institutional adaptive capacities through coordinated governance efforts. Adaptation planning can involve conducting climate risk scenarios, impact assessments and strategic planning formulations to support integrated disaster risk reduction and advance stakeholders' capacities to address contextual risk issues. However, the IPCC reports that empirical investigations of adaptation planning processes have found that there is limited evidence of cases of adaptation policy and planning implementation due to resource, institutional and capacity-barriers. Further obstacles include conflicting governance policy priorities and complexities associated with acting on climate change uncertainties, notably longer-term temporal scales. A key attribute complicating climate change adaptation planning is the spectral range of potential global climate change outcomes that are largely contingent on human development pathways and current efforts taken (or not taken) to reduce greenhouse gases and adapt to the onset of global climate change and current and future impacts.

This literature review provides a conceptual basis for conducting case study analysis of multi-level adaptation governance (Corfee-Morlot, 2009). Investigating the challenges and opportunities for coordinated adaptation policy design in multi-level governance contexts draws attention to how the delegation of policy power and agenda setting can impact social processes of adaptation policy and planning and the options available for adapting to climate change the local scale (Horak, 2012). Empirical adaptation governance case studies indicate there are key roles for supporting local adaptation through the dissemination of resources and capacity-building support from higher levels of government (e.g., Hanna et al., 2014; Schauffler, 2014; Ekstrom and Moser, 2013).

Advancing research of the social landscape of vertical and horizontal institutional relationships in multi-level adaptation governance contexts requires analytic attention to

factors such policy jurisdiction, legislative capacity, resource allocation and monitoring responsibilities, as important aspects that affect boundaries of adaptation decision-making for stakeholders at the local scale (Jones, 2012). Generating ‘bottom-up’ research findings can illuminate the social barriers and opportunities facing local adaptation in order to recommend for more effective regulatory and adaptation governance frameworks through horizontal and vertical governance coordination and collaborations (Moser, 2009). For further literature review and discussion on topics of multi-level adaptation governance please see Moser and Boykoff (2013), Hunt and Watkiss (2011), Adger et al., (2009) and Schipper and Burton (2009). This chapter now reviews the conceptual and methodological underpinnings of three selected examples of adaptation case studies (Manuel-Navarette and Pelling, 2015; Porter et al., 2015; and Biesbroek et al., 2010) as a preface to the presentation of the study design used in this PhD research.

2.4 Adaptation case studies: emerging comparative case study methods

2.4.1 European cross-national adaptation case study

In conducting adaptation case studies of a comparative nature at the European national scale, Biesbroek et al., (2010) preliminarily developed an inductive, emergent conceptual framework of six crosscutting themes. Policy analysis of national adaptation strategies allowed for researchers to identify six key policy process themes for comparative analysis across cases, with external alignment to discussions in the existing literatures. Conceptual research themes were developed using content analysis of national scale adaptation strategies in European nation states with high adaptive capacity (citing Haddad, 2005) and similarities in policy-making processes of strategic adaptation planning developments. Additional considerations of similar climatic impacts across geographic boundaries, and pragmatic considerations related to data access were also considered in case study site selections. The comparative conceptual framework developed by Biesbroek et al., was also based on recognitions of inadequacies in existing adaptation research frameworks for conducting comprehensive comparison of adaptation strategies between countries.

The European adaptation study found that the topics, methods and approaches to strategic national adaptation planning shared resemblances based on similarities' in projected impacts on sensitive sectors, but also in shared negative attributes related to limited scientific and political understandings of adaptation, which complicated its meaning in practice. Differences in the national perspectives of 'cost-effective, efficient adaptation policies and decision-making' were found to complicate national level planning, while uncertainties of climate change (ex. long time-frames, gaps in scientific research and knowledge) problematized adaptation implementation.

As a result, national adaptation strategies were found to be abstract, tending towards the continued facilitation of adaptive practices and discussions as opposed to the imposition of particular solutions. Biesbroek et al., highlighted the issue of financing for adaptation given the unknown costs for many adaptation options. Further differences in social dimensions and complexities associated with multi-level governance were believed to hinder the facilitation of institutional and organizational responses to complex social phenomenon such as the multi-level governance of climate change adaptation.

However, these adaptation policy analysts argue that in some cases, national adaptation strategies served as a positive means for setting the adaptation agenda: by coordinating and integrating adaptation responses between levels of government, while stimulating and enabling local initiatives. They observed that national adaptation strategies offer a means for: i) maintaining political momentum on adaptation; ii) raising national awareness by placing governmental recognition of climate change impacts; iii) anticipating the extra-national policy implications with respect to the need for having domestic adaptation strategies on the national policy-making agenda to remain relevant in the broader global context of climate change policy; and iv) furthering the importance of enabling local scale responses to coherently, definitively and deliberately advance and deliver adaptation interventions and measures. Other key findings of this research indicated that the timing and scale of adaptation strategic responses were nationally bounded and related to pre-existing sectoral and regional approaches to address vulnerability, with shared learning experiences communicated across boundaries.

The Biesbroek et al. (2010) study comparatively documents, at a national scale, what the key barriers to adaptation processes and stakeholder coordination are, and how multi-level governance policy co-ordination and implementation actually occurs. As well, the study elaborates on the practical aspects of how adaptation actions are designed, organized and financed by governments. The study suggested that key roles for governments include: i) information provision and awareness raising; ii) supporting the development of adaptive capacity; and, iii) contributing to the development of regulations, instruments and incentives for the integration of adaptation policies and practices across government institutions and processes. However, as the IPCC (2014) has recently noted, the empirical evidence of these laudable goals for adaptation policy integration stills remains lacking.

2.4.2 Yucatan regional and nested adaptation case study

In a second example of a regionally based adaptation case study, Manuel-Navarrete and Pelling (2015) examined local climate change governance in the Yucatan Peninsula, Mexico. The study investigated climate change governance responses at the local scale by conceptualizing individual community cases as ‘nested’ within pre-existing larger processes of socio-ecological change and contextual political dynamics. These theorists have argued that socio-ecological systems are a collective, organized product of human design, intentionality, politics and responses to environment changes. Similar to Bassett and Shandas (2010) dual characterizations of patterns of local climate policy emergence, Manuel-Navarrete and Pelling more broadly suggest that socio-ecological systems’ patterns of adaptation to climate change may relate to: i) autonomous self-organization; and/or, ii) pre-designed adjustments to environmental changes. This conceptualization suggests further that transformative changes in socio-ecological systems may relate to, proactively or reactively, breaking down and significantly altering established development pathways either by the design of human structures (e.g., globalization) and/or by the disaster of natural forces (e.g., climate impacts).

Conceptually, Manuel-Navarrete and Pelling discuss adaptation governance as offering a transformative new political space beyond incremental adaptation approaches. They suggest adaptation offers profound potential for developing new understandings of the

abilities for integrated system approaches to address the risks and inequalities currently being left unmet by existing development frameworks. They argue that the looming (potentially catastrophic) impacts and implications of unmitigated climate change on developing societies, further underscores the need for a transformative politics of adaptation.

This conceptual development in the adaptation literature focuses attention to the transformative potential for local climate adaptation actions to advance beyond Bulkeley and Betsill's claim that a paucity of political space at the local scale hinders climate change policy efforts. Instead, Manuel-Navarrete and Pelling suggest there is a need for scholastic innovation in the research conceptualization of authority/subjectivity and the related dimensions of politics and power affecting adaptation. This can bring case-based climate change adaptation research closer to the conceptual realms of critical theory and political ecology (See also: Taylor, 2015).

Manuel-Navarrete and Pelling's research approach for developing contextual understanding of the comparative politics of adaptation and development in communities of the Yucatan Peninsula, Mexico provides an important example of a case-based method for developing further conceptual understandings of local scale adaptation in relation to the power dynamics inherent in multi-governance structures. In documenting and developing knowledge and understanding of the subjective views of adaptation stakeholders' perspectives at the local scale, these theorists argue that the drivers of climate change risk are reproduced through inequities in individual and economic relations, organizational structures, including multi-level governance; as well as through patterns of land-use and development, environmental quality and access to services. Manuel-Navarrete and Pelling note the comparative politics of development, adaptation and/or transformation have differential implications for contextual, place-based narratives of socio-ecological change; often co-existing with contradictions that are 'empirically distinctive across institutions, identities, practices and social, ecological materiality' (2015:2).

Despite observable contradictions in comparative local scale adaptations, these theorists argue that there is a tight, material coupling between risk and development and the historical and socio-ecological narratives shaping places and their relationships to local environments. Manuel-Navarrete and Pelling use the terminology of ‘deliberate transformation’ to describe the object of their adaptation research at the case level: purposefully initiated, radical changes simultaneously carried out by human agents to reduce inequalities to climate risks, triggered or in response to hurricanes or market shocks. In this particular study, an actor-centered approach focused on assessing human agency is used to build case understanding of the symbolic, conceptual boundaries of various policy objects of study (see Table Two).

Manuel-Navarrete and Pelling (2015)	Biesbroek et al., (2010)
<ol style="list-style-type: none"> 1. Agenda-setting 2. Goals and options 3. Issues 4. Contexts 5. Baselines or methods 	<ol style="list-style-type: none"> 1. Motivations establishing adaptation strategies 2. Science-policy and research coordination interactions 3. Communication and knowledge transfer approaches 4. Distribution of tasks and responsibilities between levels of governance 5. Institutional arrangements for the incorporation of adaptation in sectoral policies 6. Assessing the means for whether and how countries would ensure adaptation strategies’ implementation and review

Table 2: Samples of conceptual frameworks and policy objects for adaptation case study analysis

2.4.3 UK adaptation case study – local linkages to the multi-level governance context

To further illustrate how conceptual adaptation planning and policy making research issues are dealt with by field researchers and adaptation policy analysts, in the third example of a UK adaptation case study, Porter et al., (2015) discuss how much of the empirical research on adaptation policy-making, planning and decision-making, to date, has occurred via singular case-based analysis. This research trend has problematized the development of more generalizable multi-level adaptation governance theories.

Porter et al., report that comparative and cross-sectional approaches for conducting adaptation case studies have been proposed and utilized as methodological means to address the need for larger sample sizes and more robust scholarly comparisons to inform adaptation theory development. However, Porter et al., contend that methodological difficulties still persist in the definition of clear, consistent and measurable variables that can be utilized to identify general patterns across individual cases of adaptation. In line with Murtinho and Hayes (2012), Porter et al., argue such clear definitions are required in order to develop and comparatively test propositions that can provide more robust explanations, via quantitative and/or critical qualitative analysis approaches. This indicates that research designs and methods capable of producing findings that can contribute to the robust development of more generalizable theories of adaptation are sorely needed, including through the development of replicable research designs for conducting comparisons across and between adaptation case studies.

In this study, Porter et al., (2015) developed a mixed methods approach that utilized longitudinal comparisons of decadal time-series and temporally separated data sets (e.g., surveys, interviews) based on previous and updated research conducted in UK local governments. This study conducted comparative statistical survey analysis and qualitative analysis of local government perspectives about the progress of adaptation responses by specifically probing the relationships between local governments to the ‘usability’ of climate science. In this specific UK municipal adaptation case study, content analyses of interview transcripts were manually analyzed using NVivo qualitative data software to manifest emergent thematic codes and to iteratively engage with interview and survey data. Rigor and reliability of this study’s findings involved source, method and investigator triangulation (citing Baxter and Eyles, 1997) to robustly assess and measure longitudinal changes in the perceptions, practices and adaptive capacities of local government decision-makers involved with climate change adaptation policy and planning. Targeted demographics of this study included a large and heterogeneous mix of respondents in relevant administrative occupations of local governance structures, across a spatial diversity of UK local governments.

The Porter et al., (2015) study found that the barriers to local adaptation have changed over time, and notably that improved access to climate change information has contributed to the reduction of stakeholders' cognitive barriers for understanding local adaptation issues in relevant decision-making areas. This finding indicates that as access to climate change information increases, stakeholders' competencies for managing local climate change risks are improved.

The study also found that top-down governance targets and monitoring had been an instrumental aspect in spurring the development of local climate adaptation plans. However, the abilities for local governments to move beyond adaptation planning to policy implementation were observably hindered by overly simplistic governance notions that solely the provision of climate change information through hierarchal governance structures was enough to 'raise capacity' and contribute to local governments making the rational progression from strategic planning to the implementation of local adaptation actions.

In the added example of Ekstrom and Moser's (2013) complementary adaptation case study, across individual case analysis of five local governments in San Francisco Bay area of the United States provided insights about the barriers and opportunities for climate change adaptation policy and planning. The study conducted with local government officials' in autonomous adaptation policy-making environments found commonly held perceptions that the predominant barriers facing local climate change adaptation policy and planning development and integration included: i) institutional governance issues; ii) decision-makers' personal attitudes; iii) values and motivations (e.g. lack of interest, status quo mindset, inability to accept change, narrow self-interest); iv) lack of resources; v) funding; and, vi) 'politics'. The study also found that in the American context, the top opportunities for local adaptation policy development and integration included: i) local scale policy and management changes; ii) communication; iii) cooperation; and, iv) formalized partnerships, networking and informal relationship building. However, these adaptation capacity building opportunities obviously would not be contributive to redressing broader issues associated with 'institutional governance

issues’, ‘politics’ and the lack of resources and funding hindering local scale adaptation efforts in broader multi-level governance contexts.

The Porter et al., (2015) study reiterates findings generated in other adaptation case studies (e.g., Ekstrom and Moser, 2013) that important social barriers such as: i) cross-scalar political leadership; ii) multi-level governance institutional limitations and fragmentation (including poor policy coordination); and, iii) inadequate or unreliable funding, are key hindrances to developing and implementing tangible climate plans and actions on adaptation issues at the local scale. The Porter et al., study (2015: 421) concludes that: ‘...wider institutional, political, attitudinal and financial barriers and different kinds of adaptive capacity [including] ‘generic’ human development capacities such as financial and human resources, and those ‘specific’ to climate adaptation including disaster planning, insurance funds, and scenario development’ are influential social factors affecting the abilities of UK municipalities’ to develop the specific capacities required for addressing climate change adaptation at the local scale.

2.4.4 Summary

This brief literature review offers conceptual insights based on the foundational findings and recommendations highlighted in the adaptation case studies conducted by Porter et al., (2015), Manuel-Navarrete and Pelling (2015), IPCC (2014), Hanna et al., (2014), Schaffler (2014), Ekstrom and Moser (2013), Biesbroek et al., (2010) and Bassett and Shandas (2010). This representative body of work finds further synergies with Leck and Simon (2013) who discussed the importance of strengthening multi-level collaboration to overcome policy barriers and support local level institutional mechanisms for climate action. Their work notes that policy power, resource distribution and differential horizontal and vertical jurisdiction and responsibilities between institutions challenge effective climate change policy coordination and collaboration in multi-level governance.

After Moser (2009), Leck and Simon advocate for conceptual approaches to understanding governance dynamics and the diagnostic factors that can facilitate and constrain local climate change adaptation planning, decision-making and implementation.

Leck and Simon conclude that complex environmental issues, such as climate change adaptation, require cross-scale governance collaboration and policy innovation in multi-level governance structures and institutions to overcome existing barriers. Collaboration and innovation can synergistically optimize opportunities for effective action on climate change at the local scale. In practice however, Leck and Simon observe that these laudable multi-level governance climate objectives present significant and dynamic challenges. Existing realities of governance fragmentation, competing political and policy-making agendas and priorities, has led to the proliferation of values-based approaches to environmental problem solving (e.g., reliance on ‘autonomous’ and horizontal change agents as discussed by Bassett and Shandas, 2010). The multi-level governance of climate change adaptation necessitates developing more substantial, comprehensible theories to guide actionable policy-making approaches.

Based on this review of adaptation case studies, multi-level adaptation governance and local adaptation planning and policy developments may relate to social impact factors such as institutional coordination/cooperation between levels of government on issues such as resource distribution for adaptive capacity building. Other factors such as local leadership to encourage adapting to contextual risks associated with a changing climate may be a pertinent social factor impacting adaptation at the local scale. These indicators provide examples of social impact factors that may critically contribute (or conversely constrain), the initiation, capacitation and level of integrated adaptation policy outcomes at the local scale in broader multi-level governance contexts.

2.5 Study design: Conducting comparative adaptation case studies in multi-level governance contexts

There is a need for adaptation case study research to provide methodological clarity in the conduct of adaptation case studies. Murtinho and Hayes (2012:512) contend there is a need for ‘greater clarity in how field researchers define adaptation, examine the relationship between disturbance and adaptive responses and evaluate the outcomes of adaptation [planning] processes’ between cases’. This literature contribution suggests that because of the challenges associated with research and contextual heterogeneities

between cases, ‘greater conceptual and methodological clarity may provide a much needed empirical foundation to our understanding of adaptation processes’.

Adaptation policy research considers the conceptual horizontal and vertical linkages between the situated power of decision-makers’ and the actor’s sphere of influence in institutional decision-making context of multi-level adaptation governance processes (Moser, 2009). Attention to power dynamics is important when constructing a case based research approach focused on exploratory, descriptive documentation and analysis to develop empirical understanding of municipal climate adaptation planning in multi-level governance case contexts (Howlett and Giest, 2013; Howlett, 2011, Howlet et al., 2009). The application of this type of planning and policy research, as Corfee Morlot et al., (2009:2) suggest, relates to understanding how cross-scalar advancements in the governance of climate change can occur. This requires multi-stakeholder research and engagement to produce results contributive to:

...avoid[ing] policy gaps between local action plans and [higher government] policy frameworks (vertical integration); and to encourage cross-scale learning between relevant departments or institutions in local and regional governments (horizontal dimension)... [multi-level] integration allows two benefits: i) locally led or bottom-up where local initiatives influence [higher government] action and [higher government] led or top-down where enabling frameworks empower local plans.

This study specifically targets Nova Scotia adaptation stakeholders at the municipal and provincial scale to generate evidence contributive to developing knowledge and understanding of the gaps and opportunities for multi-level adaptation governance improvements.

Corfee-Morlot et al., suggest that a hybrid model of policy dialogues can use research to produce ‘lessons learnt’ that provides opportunities for fining-tuning and better enabling adaptation governance frameworks. Applied adaptation policy findings can have broader implications for policy replication across jurisdictions, for example through horizontal dissemination and replication of the successful enabling conditions for multi-level adaptation governance. A second applied research output is to contribute evidence and analysis that can improve policy coherence and enable opportunities for municipal adaptation planning integration and implementation in multi-level governance contexts.

The MCCAP provides an excellent case study for advancing scholarly insights and policy dialogues about impactful social factors affecting municipal adaptation in multi-level governance contexts. This research is useful for informing future iterations or replications of multi-level adaptation governance approaches. By identifying impactful social factors affecting municipal adaptation planning in multi-level governance contexts, the study aims to contribute conceptual and applied insights about the social impact factors enabling conditions that encourage institutional adaptive capacity building to reduce climate vulnerability through enabling adaptation policy and planning integration at the local scale. To do this, the study uses case study research and analysis within the broader MCCAP case, and across three individual cases of adaptation policy-making processes in Nova Scotia municipalities. Discussion relates the MCCAP findings to broader multi-level governance and adaptation literatures in order to produce ‘lessons learnt’ findings and results that are informative to future conceptual adaptation research and hybridized applied adaptation policy developments and knowledge applications.

2.5.1 Conceptual research approach

The framework used in this study builds on Corfee Morlot et al., (2009) as well as the conceptual and methodological literature previously reviewed. Corfee-Morlot et al., (2009) underscore that adaptation integration offers benefits for all conceptual stages of the multi-level governance adaptation planning policy process. The conceptual research approach used in this study proposes three conceptual policy making themes as an overarching framework for describing, exploring and discussing impactful social factors affecting municipal and provincial policy making functions in a multi-level adaptation governance context (See Figure Two and Appendix A2).

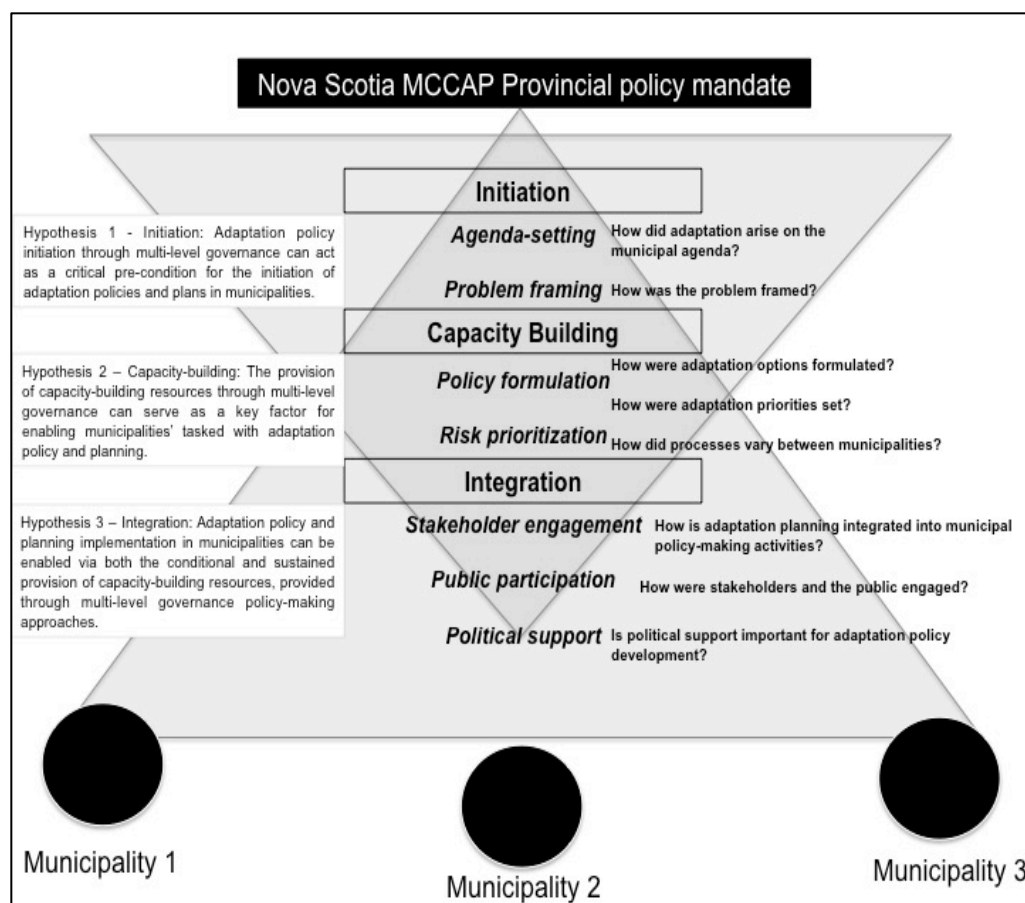


Figure 2: Conceptual framework for MCCAP case study analysis

The research question in this study is: What are the social factors that impacted municipal climate change adaptation policy and planning processes in the multi-level governance context of Nova Scotia's MCCAP? Based on the literature, three policy-making themes of conceptual interest are posited to be important for answering this research question. In the MCCAP multi-level adaptation governance case study, the three conceptual themes of research interest include:

1. The impactful social factors and conditions that lead to the *initiation* of municipal adaptation policies and plans in multi-level adaptation governance contexts;
2. The impactful social factors and conditions that enable and constrain adaptation *capacity-building* in municipalities in multi-level adaptation governance contexts;
3. The impactful social factors and conditions that enable and constrain adaptation planning and policy *integration* and implementation at the local scale in multi-level adaptation governance contexts

Addressing the first conceptual theme for case study research and analysis requires identifying impactful social factors and conditions that contribute to the initiation of adaptation policy-making and planning in municipalities: *What initiates municipal adaptation planning in multi-level governance contexts?* In Chapter Three, Vogel and Henstra (2015) review how agenda setting and problem framing may pertain to inside organizational initiation patterns that rely on operationalizing technical expertise, often in the wake of disaster related focusing-events that provide opportune windows for policy-making entrepreneurship. Chapters Four and Five further explore and describe impactful social factors affecting adaptation-planning initiation in the Nova Scotia MCCAP multi-level adaptation governance context using this research design. Focus group results are re-tested using an iterative online survey to produce findings that narrow the scope of analysis for individual case comparisons of interviews results across municipal cases. Comparative findings illustrate and discuss social impact factors, using three purposively selected municipalities to provide context and depth to aggregate level, iterative survey findings. This method advances conceptual and empirical knowledge of the impactful social factors influencing municipal adaptation planning in a multi-level governance context, using depth and breadth research to advance conceptual discussion.

The second conceptual theme relates to impactful social factors and conditions that build capacities for adaptation planning and policy-making in municipalities: *What contributes to enabling adaptation capacity building and the social conditions for municipal adaptation planning?* In Chapter Three, Vogel and Henstra review how municipal processes of policy option formulation and adaptation and risk prioritization often occurs in small, internal working groups tasked with identifying adaptation options, utilizing diverse techniques such as the comparative assessments of hazards, risks and vulnerabilities in order to facilitate the prioritization of adaptation actions. Focus group results in Chapter Four prelude iterative testing using an online survey narrow the scope of prioritized social impact factors analyzed using individual cases. In Chapter Five, comparative cases illustratively explore and describe key social impact factors affecting adaptation planning capacity building, based on the empirical observations within the larger case of the MCCAP case study, and illustrated across internal MCCAP individual municipal cases, and in relation to existing literatures.

The third conceptual theme for research and analysis relates to impactful social factors and conditions that contribute to the integration of adaptation into the planning, policies and practices of municipalities: *How does adaptation-planning implementation in multi-level adaptation governance contexts occur?* Relatedly, what are the social factors that impact adaptation integration into the planning, policy-making and operational decision-making practices of municipal institutions? In Chapter Three, Vogel and Henstra review how engaging stakeholders and public participation provides important opportunities for generating and operationalizing local knowledge and expertise through multi-stakeholder collaborations, and that this social process plays important roles that can support policy integration into day-to-day activities. However, while integrating adaptation is arguably required to provide policy coherence, it requires overcoming significant social and institutional constraints, notably including the symptomatic condition of multi-level governance institutional fragmentation and lack of political leadership for climate action.

In Chapter Six, impactful social factors affecting municipal adaptation planning integration in multi-level adaptation governance contexts are illustrated across individual cases and in contrast to existing literatures. The lack of local ‘political will’ to act on adaptation priorities may relate to scarce resources, competing priorities and reciprocal low levels of public demand for adaptation which problematizes adaptation policy integration as a priority on the municipal agenda. In Chapter Three, Vogel and Henstra review how the generation of political will and leadership is viewed as an essential element influencing how adaptation policy development and how adaptation integration may occur (or not occur). It is notable that there are multiple and complex barriers and constraints hindering local political leadership on climate change, in multi-level governance contexts.

2.5.2 Mixed Methods Research Design

Research was conducted directly with Nova Scotia municipal adaptation stakeholders in 2014 and 2015. Using combined, within case study analysis of the MCCAP and individual case analysis of municipal adaptation planning processes in three purposively selected municipalities aimed to provide scholarly insights to advance knowledge of the social impact factors affecting municipal planning processes in a multi-

level adaptation governance context. The use of mixed methods also included variations in source data and external discussion of findings in relation to literature, providing methods for triangulating this study. Further methodological explanations and justifications for the research design are offered in Appendix A1.

In this study, primary data was gathered through focus groups, an iterative online survey and semi-structured interviews. Preceding primary data collection, content analysis of MCCAP documents was conducted using experimental coding based on functional, thematic policy-making categories (Vogel and Henstra, 2015; See Appendices B1-B4).

2.5.2.1 Content analysis

Preceding fieldwork, a purposive sample of the MCCAP data set was analyzed for content similarities, differences, trends and patterns. Content analysis of MCCAP plans provided an unobtrusive method to familiarize the researcher with the background context. The content analysis used an experimental test of the functional thematic framework described in Chapter Three, to preliminarily assess and analyze MCCAP texts to identify social factors impacting municipal adaptation policy-making processes (Appendix B1). Latent and partially manifest coding of the MCCAP plans was advanced by developing and using a content analysis guide for application in NVivo to create thematic categories for analysis (Appendix B2). Compiling this background MCCAP information was useful and necessary for informing the research context of conducting fieldwork about the MCCAP multi-level adaptation governance framework. Content analysis of a representative sample (e.g., 71% meta-sample of Nova Scotia MCCAPs; 61% targeted-sample of Nova Scotia MCCAPs) of MCCAP plans was conducted. The policy document mandating MCCAP completion (SNSMR, 2011) was also analyzed to advance background knowledge (See Appendix B3). A key finding of this research related to the demographic structures of MCCAP committees (See Figure Three). Search text queries revealed widespread mention of the Gas Tax mandate (Appendix B4). This information aided in the scoping of research to identify relevant stakeholders to target for research participation in the data collection strategy.

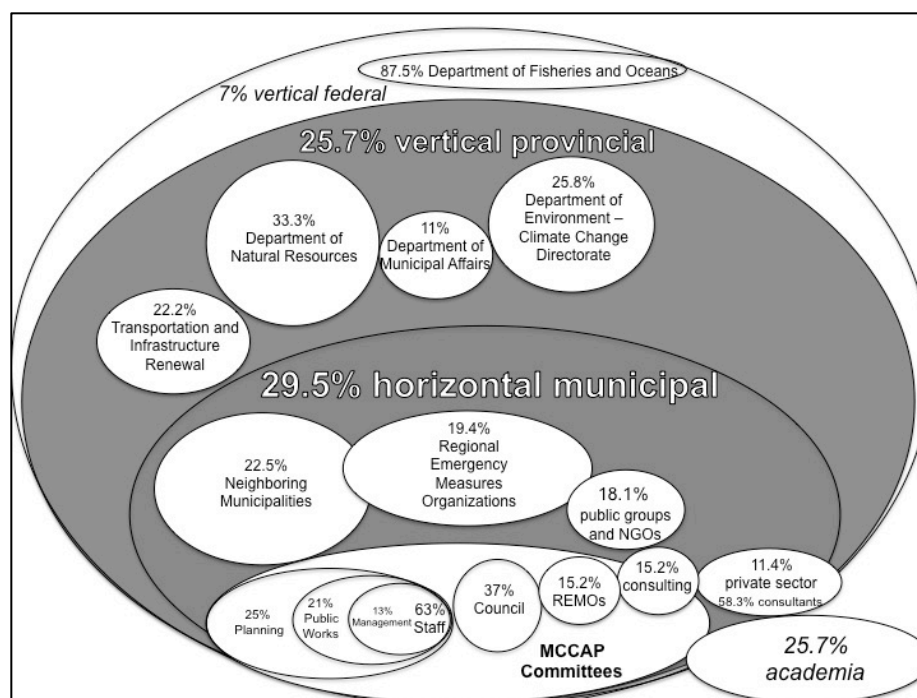


Figure 3: MCCAP stakeholder collaborations - conceptual diagram of multi-level adaptation governance in Nova Scotia (Based on content analysis of 22 municipalities in 4 regions selected for 4 focus groups) NOTE: Shading denotes bounded scope of case inquiry

2.5.2.2 Focus groups and online survey analysis

Building from the content analysis findings, field investigation and data collection advanced opportunities for further description and analysis of social factors impacting municipalities in the MCCAP multi-level adaptation governance framework, based on the perspectives of municipal adaptation stakeholders. The research goal was to advance knowledge of the social factors impacting municipal adaptation in multi-level governance contexts by determining: i) what were considered prioritized social impact factors at the aggregate level; and, ii) illustrating prioritized social impact factors comparatively by using individual cases of adaptation planning to thematically explore and describe similarities, differences and contrasting patterns across cases and externally in relationship to the literature. Specifically, the study used ‘within MCCAP’ analysis of provincial data to produce aggregated opinion trends about social impact factors affecting municipal adaptation processes. Producing ‘within MCCAP’ case insights used focus groups (See Appendices E1 and E2) to gather a breadth of data for iterative testing using an online survey (See Appendices G1-G4).

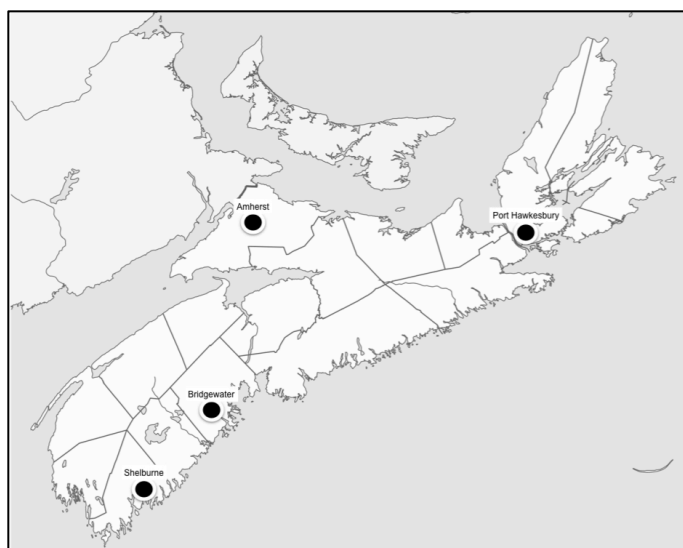


Figure 4: Regional sample areas for targeted MCCAP content analysis & site locations of regional focus groups (Amherst, Port Hawkesbury, Bridgewater and Shelburne, Nova Scotia: September 2014)

Primary data collection utilized four regional MCCAP focus groups (n=35 municipal adaptation stakeholders, see Figure Four) to collect data for analysis and iterative testing through one online survey (n=26 municipal adaptation stakeholders). Research findings largely reflect the opinions of the purposively targeted demographic: municipal land-use planners tasked with preparing MCCAPs for municipalities.

In this study, iterative testing of focus group findings (26% representative sample of Nova Scotia municipalities) used an online survey that garnered a 36% representative sample of all Nova Scotia municipalities. In this regard, the results of the iterative-online survey provide a more than a one-third representative sample of the opinion of the target demographic of municipal adaptation planning stakeholders.

While focus group findings preliminarily identified a wide range of social factors worthy of further verification and in-depth analysis at the case level, the iterative use of an online survey was carefully selected as a research method to re-test focus group results in order produce prioritized opinion trends about impactful social factors worthy of further depth illustration in individual MCCAP municipal planning case contexts. The online survey provided a means for narrowing the scope of furthering illustrative, depth and cross-case

analysis using the prioritized opinion trends in excess of three-quarters sample agreement as a means to focus inquiry at the individual case level.

To prioritize opinion trends, an inductive ‘screening’ mechanism segregated survey findings in excess of a level of three out four participant agreement ($\geq 75\%$) to narrow the analytic scope of social impact factors worthy of illustrative attention in the interview analysis of municipal adaptation stakeholder perspectives. This research design choice facilitated the researchers’ abilities to overcome logistical research constraints (e.g., geography, money, time). The design usefully advanced within case and ‘across individual case’ analysis of the Nova Scotia multi-level adaptation governance framework at the individual municipal MCCAP scale, to illustrate how impactful social factors affected municipal adaptation processes.

Iteratively tested, prioritized opinion trends about social impact factors affecting municipal adaptation in the multi-level governance context of Nova Scotia’s MCCAP, were then illustrated in contextual depth by conducting thematic analysis of texts generated based on interviews MCCAP planning processes in three purposively selected municipalities, with external voice provided by non-municipal stakeholders. The objective was to use individual case / depth-context insights to compliment illustrative within case / aggregated-iterative results. This provided a mixed methodology for depth description and illustration of how prioritized social impact factors comparatively affected individual cases of municipal adaptation planning processes in the MCCAP multi-level governance case context of Nova Scotia.

2.5.3 Individual case studies: Interview analysis

Individual case analysis of three municipalities utilized semi-structured interviews conducted in similarly sized and ‘at-risk’ coastal municipalities of Nova Scotia as a means of providing thicker, richer and more detailed descriptions of individual municipalities’ MCCAP adaptation policy-making processes (Baxter and Eyles, 1997; See Appendices F1-F3). The case study illustratively explores, describes and contrasts the social impact factors affecting individual municipalities adaptation policy-making

approaches, within the aggregated context of priorities determined impactful by more than a third of Nova Scotia municipalities tasked with the MCCAP mandate.

Interviews were conducted with municipal adaptation stakeholders (n=six) in three municipalities in 2014. In the individual case studies, municipal adaptation stakeholder perspectives are further contrasted with non-municipal perspectives (n=four) to provide broader contextual insights based on external non-governmental, consulting and provincial government perspectives. Findings are also externally discussed further, in relation to conceptual literatures. This research approach provided a useful means for synthesizing findings and engaging with literature to bridge the lacuna between the MCCAP multi-level adaptation governance case study and the thematic, functional conceptual framework.

Individual case analysis used three purposively selected municipalities (see Figure Five, p.145 and Appendix F3) to explore, describe and provide contextual depth illustration to the prioritized social impact factors produced using a focus group / iterative online survey approach. Individual case study analysis used the prioritized social impact factors to comparatively explore interview results, by using the thematic functional policy framework as the rubric for across case study analysis of interview findings with conceptual literatures.

Chapters Five and Six operationalizes the conceptually thematic research framework to examine the process-oriented social conditions and impactful factors that affected three individual municipalities' abilities to initiate, build capacity and integrate adaptation policies and plans in the broader MCCAP multi-level adaptation governance context. Discussion focuses on the Nova Scotia municipal/provincial multi-level adaptation governance context, and how underlying social issues acting on adaptation capacity, may relate to governance level differences in policy power, agenda setting, resource distribution and jurisdictional authority and responsibility as impactful social factors affecting municipal adaptation planning processes (Horak, 2012).

2.5.4 Case study analysis

Multi-level governance climate policy innovation is evident in the unique case of Nova Scotia. Given the paucity of documented cases of multi-level adaptation governance and lack of agreement on adaptation comparative methods, case study analysis offers a research methodology that serves as an exploratory, descriptive prelude contributive to the advancement of future adaptation case studies (Hay, 2010; Nagy-Hesse Biber and Leavy, 2004). The researcher notes that developments in case-based methods of adaptation governance inquiry may be capable of producing more reliable results, for example, by using case study analysis based on larger sample sizes (Hanna et al., 2014) or longer time series data (Porter et al., 2015).

Documenting and developing new understanding of multi-level governance models of adaptation planning and policy frameworks through case study can serve an instrumental value in further developing adaptation policy-making concepts, processes and disseminating knowledge of effective adaptation governance practices across jurisdictions (IPCC, 2014). Documented case evidence of successful adaptation policy frameworks and multi-level governance approaches may also contribute to advancing political leadership and stakeholder support for the wider initiation of municipal adaptation agenda-setting and strategic planning processes (Bassett and Shandas, 2010; Corfee Morlot et al., 2009).

This case study conceptually proposes that hierarchal governance monetizing adaptation planning, contributes to municipalities' initiating adaptation plans. The powerful agenda-setting and problem framing role that the gas tax mandate played in initiating adaptation planning in Nova Scotia municipalities is cross-examined throughout the dissertation. The relationship between the provincial government responsible for the development and implementation of the MCCAP policy mandate and gas tax reporting requirement can be understood as a key social impact factor at the municipal level and thus is worthy of documentation using descriptive and exploratory case study analysis.

This chapter has developed a thematic, functional conceptual research framework to guide the case study analysis. The proposed conceptual framework has built on existing

literatures to construct a theoretical foundation and a grounded research approach for describing and exploring conceptual multi-level adaptation governance propositions related to initiation, capacity-building and integration, via the utilization of functional policy themes to conduct exploratory data analysis in a case of multi-level adaptation governance. The objective of the case study analysis is to generate new insights about impactful social factors affecting the development of municipal adaptation policies and plans in a new multi-level adaptation governance framework (Patton, 2002).

This case study methodologically source triangulates the production of a rich breadth and depth of empirical data for analytic comparison with the conceptual framework (Flyvberg, 2006). Exploring the conceptualized importance of multi-level governance relationships to municipal adaptation planning and policy-making initiation, capacity building and integration is the central pillar of this analytic strategy. The primary goal of this study geared at advancing within and individual case study adaptation research approaches to provide a formative, exploratory and descriptive case study that effectively documents, assesses and illustratively analyzes the social impact factors that affect municipal adaptation policy-making in a multi-level adaptation governance context.

Appendix A1 provides further details, defense and justification of the research design utilized in this PhD study.

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Chapter Three

3 Studying Local Climate Change Adaptation: A Heuristic Research Framework for Comparative Policy Analysis

The purpose of this chapter is to contribute to the conceptual and methodological foundations of a research agenda for comparative analysis of local climate change adaptation policy. To this end, the article synthesizes insights from policy studies literature and contemporary climate change adaptation research in order to identify and operationalize salient objects for comparative policy analysis. The chapter discusses research design, proposing a comparative case study methodology that combines qualitative research techniques as the vehicle to examine policy elements in empirical settings. The analysis is presented as a heuristic research framework to guide comparative empirical research about adaptation policy interactions across governance scales.

3.1 Introduction

Climate change poses significant risks for cities and communities. Global changes in temperature and precipitation are projected to result in a range of negative local impacts, such as flooding due to overwhelmed drainage infrastructure, water supply deficits and greater wildfire activity caused by extended dry periods. The longer-term risk of sea-level rise will exacerbate flooding and storm surge in coastal areas (IPCC, 2012; IPCC, 2014a; McBean, 2004). Moreover, climate change hazards, such as extreme heat and severe storms, are serious threats to human health and safety.

Governments around the world have begun responding to these risks through climate change adaptation policies—courses of action designed to reduce the vulnerability of populations, assets, and operations to climate change-related risks (Susskind, 2010; Henstra, 2012). Much of this policy development activity has taken place at the local level, and climate change adaptation policy analysts have identified significant local initiatives in both developed and developing countries (Carmin and Zhang, 2009; Satterthwaite et al., 2009; Hunt and Watkiss, 2011). Over the past decade, there has been a proliferation of studies documenting various aspects of local adaptation policy

development, including the enabling conditions that facilitate action and barriers that pose challenges for local policy makers (IPCC, 2014b).

However, adaptation is a nascent policy field. Our knowledge remains limited concerning the scope and substance of adaptation policies, as well as the process by which policies are developed and implemented in this domain. This is attributable, in part, to research design: much of the analysis to date has been in the form of individual case studies, which are instructive, but generally do not lend themselves to comparison and knowledge accumulation (George and Bennett, 2005: 68). Moreover, though some studies have attempted to compare adaptation policy across jurisdictions, operationalization of the unit of analysis has received insufficient attention, and methods employed are typically inadequate to draw inferences about variation in policies and policy making across cases (Dupuis and Biesbroek, 2013). Murtinho and Hayes (2012:519) assert that “by providing greater methodological clarity and purposefully working toward comparative studies, fieldwork scholars can provide an empirical foundation so that scholars, practitioners, and communities can learn and benefit from the diverse adaptation processes occurring in communities around the world”.

3.2 Comparative Policy Analysis

Simply defined, public policy is a course of action chosen by public authorities to address a problem (Pal, 2014: 2). Public policy making is assumed to be a purposive exercise undertaken by governments, which involves choices about whether and how public authority and resources will be used to address problems. One choice relates to scope: how much responsibility should the state assume, and how much should be borne by individuals, households, firms, and social groups? Governments can choose to position themselves along a spectrum of intervention, ranging from little or no action at one extreme, and active, aggressive involvement at the other. A second choice relates to means. Governments have many tools to achieve policy objectives—exhortation, regulation, spending, and so on—but choosing among these instruments is one of the most contentious aspects of policy design (Salamon, 2002). Public policy is the cumulative result of these choices, which can be inferred from tangible outputs, such as decisions, expenditures, programs, and pronouncements.

Policy analysis is a process of inquiry aimed at developing and critically assessing information to understand and improve public policies (Dunn, 2012: 2; Pal, 2014: 15). There is no universally recognized methodology for policy analysis. It can involve deductive methods—the application of general concepts, principles, and theoretical propositions to observed phenomena—as well as inductive analysis, in which generalizations are drawn from careful observations of empirical phenomena, which are then tested against other cases (Howlett et al., 2009: 20).

Comparative policy analysis refers to the systematic study and comparison of public policies and policy making in different jurisdictions to better understand the factors and processes that underpin similarities and differences in policy choices (Schmitt, 2013). From an empirical perspective, examining and comparing the policy responses of different governments to a common problem can be used to draw inferences about determinants of variation, and this serves as a foundation for theory-building (Gupta, 2012). Focused comparison also has instrumental value, in that it allows policy makers faced with novel problems to draw lessons from the experiences of other jurisdictions, which can be used to design parallel domestic programmes (Rose, 2005).

There is a long history of comparative analysis in policy studies, but it has taken on greater prominence, as policy challenges increasingly transcend national boundaries, information and communications technology has facilitated comparative research, and governments have become more willing to look to the experiences of other jurisdictions as a source of policy ideas (DeLeon and Resnick-Terry, 1998). Although most policy studies in the comparative tradition have focused on similarities and differences at the national level, comparative analysis is also useful for studying local government policies (e.g., Lazar and Leuprecht, 2007).

3.3 Comparing Local Adaptation Policy

Climate change adaptation policy assumes that despite even the most ambitious efforts to reduce greenhouse gas emissions, some degree of climate change is inevitable, so impacts must be anticipated (Wigley, 2005; Hare and Meinshausen, 2006). It also acknowledges that climate change variability already exerts stress on physical, social, and

economic systems, which has not been sufficiently addressed (Ford, 2008). Analysts define adaptation in various ways, but a common thread is that it involves “adjustments”—purposive changes to practices, processes and structures to better cope with climate change and its impacts (IPCC, 2007). The central goals of adaptation policy are to reduce vulnerability—susceptibility to negative climate change-related impacts—and to increase adaptive capacity, meaning the ability to adjust to climate change in order to moderate damages or cope with consequences (Smit and Pilifosova, 2003; Smit and Wandel, 2006).

In recent years, analysts have increasingly turned their attention to documenting the adaptation actions that are taking place around the world (e.g., Berrang-Ford et al., 2011; Ford et al., 2011). Some of this work has been comparative, seeking to describe and explain similarities and differences in policy outputs, but the focus of this work is predominately national governments (Biesbroek et al., 2010; Ford et al., 2013; Berrang-Ford et al., 2014). Given the place-based nature of climate change adaptation, a similar programme of research that analyses and compares adaptation policies and policy making at the local level is warranted.

For various reasons, the local level is argued to be the appropriate locus of adaptation policy development (Bizikova et al., 2008; Richardson, 2012). Local officials play a key role in public functions that are central to climate change adaptation, such as land use regulation, building inspection, critical infrastructure protection and emergency planning (Wakeford and McGillivray, 2006; Auld and McIver, 2007). Close proximity to stakeholders and the public gives local policy makers access to knowledge about place-based exposure and sensitivity to climate change risks, which enables them to design strategies tailored to community needs (Larsson, 2003; Corfee-Morlot et al., 2011). Public engagement and mobilization in support of adaptation is more effective at the local level, because specific community risks can be used to demonstrate its importance (Hunt and Watkiss, 2011). The local level is also an optimal site for policy experimentation, in that innovative practices can be tested on a smaller scale and then replicated in other communities.

However, local officials face significant challenges in developing adaptation policies. Both the public and policy makers have difficulty grappling with the long-term nature of climate change, which requires measures to be implemented in anticipation of uncertain future threats (Wagner and Zeckhauser, 2012). Although citizens abstractly perceive climate change as a problem, the issue appears to lack sufficient salience and urgency to prompt sustained demands for government intervention, giving elected officials little political incentive to commit resources to adaptation (Lorenzoni and Pigeon, 2006; Corfee-Morlot et al., 2011). Moreover, whereas the costs of adaptation are visible and immediate, the benefits are largely intangible and will accrue mainly in the future. In the face of more immediate priorities and a lack of public demand, decision makers typically focus on the most pressing agenda items and invest in proposals that will generate short-term returns (Reisinger et al., 2011; Simonsson et al., 2011). Finally, many communities lack the expertise, personnel, and financial resources required to effectively formulate and implement adaptation policies (Crabbé and Robin, 2006; Measham et al., 2011). In light of the urgent need to adapt communities to a changing climate, understanding whether and how local policy makers surmount these numerous obstacles is crucial.

Furthermore, local adaptation policy making does not take place in isolation, but is rather embedded within a broader multilevel governance context, whereby institutional structures and policy making procedures are shaped by rules and decisions made by other levels of government, and policy choices are influenced by non-governmental actors (Urwin and Jordan, 2008; Mukheibir et al., 2013). Adaptation is a responsibility shared by all levels of government, but the appropriate scale of action and the division of tasks among local, regional, and national governments is unclear (Gupta, 2007). Divided jurisdiction constrains local policy choices, in that specific adaptation options (e.g., raising the height of a levee or dyke) are subject to legal and regulatory rules enforced by higher levels of government (Ekstrom and Moser, 2013). More broadly, articulating a clear and consistent intergovernmental vision for adaptation and coordinating efforts at various levels have proven difficult, in part because policy values and governance issues differ depending on the scale at which the climate change problem is viewed (Adger et al., 2009ab). Whereas local governments in some countries are guided by a legal or policy mandate issued by a higher-level of government (e.g., National Adaptation

Strategy), others lack the protection of a uniform national or regional policy, which weakens the impetus and support for local adaptation initiatives that face resistance from affected interests (Swart et al., 2009; Westerhoff et al., 2010; Reisinger et al., 2011). Understanding the complex, multi-scalar context of local adaptation policy making, and the ways in which non-local forces influence the adaptation policy choices of local governments, is an important priority for research in this field.

Although they are constrained by scarce resources and the limited authority delegated by higher-level governments, all local governments have some scope for autonomous policy choices, and these choices are ripe for comparative analysis (McEvoy et al., 2010). Comparative analysis is important for a number of reasons. First, it can help to contextualize knowledge about local adaptation, by considering how policy choices are made in different social and political environments. This comparative examination provides the basis for classification — the imposition of order on complex phenomena — which could help to illuminate the diversity of public responses to climate change. The comparative method also enables the formulation, refinement, and testing of hypothesized relationships between variables, as a basis for explaining differences in chosen courses of action. Finally, empirical findings from comparative analysis of local adaptation policies and policy making can enable predictions about how other communities might respond to the climate change challenge.

3.4 Objects of Comparative Local Adaptation Policy Analysis

A critical element of comparative research design is the specification of what is to be compared. As Dupuis and Biesbroek (2013) point out, the meaning of “adaptation policy” has been poorly defined and conceptualized in existing studies, creating inconsistency in measurement and limiting progress toward explanation. They argue that greater precision is required in operationalizing the “dependent variable” in comparative research.

Scholars who engage in comparative policy analysis typically focus on one of several aspects of public policy. Studies that target the policy process seek to compare how a

problem is conceptualized and brought to the attention of decision makers, and how public authorities formulate, select, and implement policy solutions (Adolino and Blake, 2011: 8-29). Policy content—the specific courses of action chosen by governments, and the means by which these are implemented—can vary considerably between jurisdictions, so this is another common focus of comparative analysis (Froman, 1968). Comparing policy quality involves scoring and/or ranking policies based on evaluative criteria, such as coherence and durability (Tang et al., 2010). Policy change is a fourth object of comparative policy analysis, which describes and explains evolution in policy goals and means over time, usually through longitudinal research that compares new or amended policies to an earlier baseline (Bauer and Knill, 2014). Finally, comparative analysis can focus on policy outcomes, meaning the consequences of policy decisions, which helps to identify ineffective actions as well as promising strategies that might be replicated elsewhere (Schmitt, 2013).

Since adaptation is in its infancy, there is considerable disagreement about the appropriate metrics of policy quality. Moreover, it is arguably too early to evaluate adaptation policy change or outcomes, given that these will be determined over time. Therefore, a high priority for comparative adaptation research must be to generate knowledge about the content of climate change adaptation policies, which provides a baseline for subsequent research on policy change. Similarly, developing comparative knowledge of the adaptation policy process can offer valuable insights on policy quality, as well as the conditions that enable or constrain policy development and implementation. These two policy objects are described and elaborated in Sections 2.5 and 2.6 below.

3.5 Policy content

All public policy designs contain a set of fundamental elements that can be analyzed and compared, including goals, targets, instruments and agents (Schneider and Ingram, 1990; Howlett, 2011). Goals set out what the policy aims to achieve, including both broad, normative statements about ultimate desired ends, as well as precise, operational objectives concerning specific behaviours or conditions that must be altered in order to address a problem. In addition to instrumental goals—those oriented toward

solving the identified problem—policies often embody other public objectives, such as efficiency, equity and security (Stone, 2002: 37). Policy documents often contain a statement of the problem to be solved and the intended consequences of the policy intervention, but goals must sometimes be inferred from statements or pronouncements, or through dialogue with policy officials (Pal, 2014: 8-9).

The central goal of adaptation policy is to reduce vulnerability of people and systems to reduce adverse consequences associated with climate change (Burton et al., 2002; Smit and Wandel, 2006). But this leaves a wide scope for policy makers to adopt more specific objectives that relate to particular local risks and priorities. For instance, local adaptation policy might prioritize preservation of the status quo, or might aspire to a new state of affairs that is more compatible with a climate-changed world (Adger et al., 2009). The policy goals might be narrow and constrained, such as protection from specific climate change-related hazards, or broad and progressive, such as the improvement of system resilience to shocks, of which climate change is only one. In a comprehensive, systematic review of adaptation literature, Berrang-Ford et al. (2011) identified more than a dozen different goals that motivate adaptation activities. Comparing the goals and objectives governments adopt in addressing the climate change problem is important for understanding variation in policy content.

Targets refer to actors and populations whose behaviour is linked to the achievement of policy goals (Schneider and Ingram, 1990: 84-85). Depending on the objectives the community seeks to achieve, policies could target individuals, households, groups, or business firms. Targeting could be narrow and precise, limited to one or a few specific actors, or could be broad and diffuse, implicating a wide range of actors and behaviors. Existing adaptation literature identifies many different potential targets of local adaptation policies. For example, Wilson (2006) noted the importance of incorporating adaptation into the work of municipal planners. Gifford et al. (2011) analyzed psychological interventions that could be used to target individual behavioral change in service of climate change policy objectives. In light of the urgent need to adapt the built environment to climate change stresses, builders, developers and building owners are also potential targets of adaptation policy (Hasegawa, 2004). Choices about which actors to

target can lead to substantive differences in policy content between jurisdictions, so this is an important subject for comparative analysis.

Instruments are the tools and techniques governments use to achieve policy objectives. For example, governments routinely disseminate information in hopes that it will influence the behavior of targets in order to ameliorate problematic conditions. In other cases, governments invoke state authority to compel desired behavior through binding regulations, which are accompanied by penalties for deviation. Financial instruments are also employed to encourage desirable behavior by providing economic incentives or to discourage undesirable behavior by imposing costs (Howlett, 2011: 101). The choice of instrument involves assumptions about the interests and motivations of policy targets, has implications for the management tasks and skills required of implementation agents, and can institutionalize long-term patterns of interaction among individuals and organizations (Salamon, 2002).

There are many tools to implement adaptation policy objectives. Some are information-based, such as hazard maps, flood forecasts and public forums, and are designed to educate audiences in hopes of influencing their behavior. Others rely on legal authority, such as development regulations that require tree planting on new residential lots, which prevents erosion from extreme precipitation. Financial instruments are also available, such as grant programmes that subsidize protective equipment to prevent storm water from backing up into below-grade spaces. The instruments selected by local governments are likely to vary from one jurisdiction to another, and this variation can be documented and explained through comparative policy analysis.

Agents are the officials and organizations who employ the instruments to implement policy objectives. Policies are most often implemented by public employees authorized to spend money or regulate behavior in pursuit of the policy goals. Outside the formal bureaucracy, there are various arms-length agencies, boards and commissions that deliver public services and regulate behavior, and these units also often serve as policy agents. Agency through partnerships with non-profit organizations or private firms is

increasingly common, particularly when the implementation strategy calls for infrastructure construction or public education and training (Girard et al., 2009).

There are many conceivable agents of local adaptation policy. Professional planners, for example, can set out a strategic vision for climate change-resilient community development and use tools such as official plans, zoning regulations and development permits to ensure land use decisions minimize climate change-related risks (Measham et al., 2011; Richardson, 2012). Those who manage public infrastructure assets, such as water distribution networks, storm water systems, roads, bridges and buildings, also have a key role to play in implementing adaptation policy objectives, by ensuring these critical systems are resilient in the face of climate change-related stress (Auld et al., 2007; Terrain Group, 2007). The choice among potential implementation agents is an element of policy content that is likely to vary from one community to another.

As this section has demonstrated, policy content can be conceptually divided into several components—goals, targets, instruments, and agents—which serves to better operationalize “adaptation policy” as a unit of analysis, and allows for finer-grained description and comparison of the scope and substance of local adaptation policy. The next section focuses on the policy process as an object of comparative policy analysis.

3.6 Policy process

Analysts commonly disaggregate the policy process into a number of conceptual stages, including: i) agenda-setting, in which problems come to be defined as important, brought to the attention of public authorities, and prioritized for action; ii) policy formulation, whereby policy makers design policy options and recommend a course of action; iii) decision making, which involves the selection of a policy option; implementation, where policies are put into effect; and iv) evaluation, which refers to monitoring and measuring the performance of the policy, often leading to amendment or redesign (Jann and Wegrich, 2007). The stages model provides a general framework for analysis and calls attention to the constellation of actors, ideas, and institutions that influence policy choices at various temporal points, but it artificially portrays the policy process as orderly and sequential (Howlett and Giest, 2013). In reality, policy actors enter

and exit at various stages of the process, and the elements of policy making often occur concurrently, rather than consecutively (Dovers, 2005: 67).

In light of this, Wu et al. (2010) reframed the five stages as “general policy making functions” and elucidated the skills and tasks that each requires of public managers, irrespective of the order in which they occur. For example, public officials are instrumental in setting the policy agenda, because they are uniquely positioned to identify emerging policy problems, screen demands for attention to particular issues, and sustain public and political attention to policy issues over time. Similarly, they have an important role in defining priorities, formulating and evaluating policy options, engaging stakeholders, and marshaling resources. This perspective is useful for comparative analysis of the policy process in different jurisdictions, because it focuses attention on policy making activities that are virtually universal. The sections below follow a similar approach, combining public policy and climate change adaptation literature to identify and elaborate seven key policy making functions that constitute potential objects of comparative analysis.

3.6.1 Setting the agenda

Constrained by scarce time and resources, local decision makers necessarily focus their attention on a limited slate of policy issues at any particular time. Problems typically secure space on this agenda in one of two ways (Cobb et al., 1976). In an “outside initiation” pattern, organized interests draw attention to a problem and cultivate support for a proposed solution, in hopes that this will stimulate active consideration by public officials. The converse is “inside initiation”, whereby a unit within government identifies a problem, engages key stakeholders to formulate a workable solution, and then puts the proposal to decision makers for endorsement.

Although both the public and politicians abstractly acknowledge climate change as a problem, issues perceived to be more pressing and solvable receive attention and priority. This is partly due to the long-term, uncertain nature of climate change, which fails to mobilize organized interests to demand action on adaptation, as is typical of the “outside initiation” model (Lorenzoni and Pidgeon, 2006; Corfee-Morlot et al., 2011). Climate

change adaptation appears to approximate the characteristics of what May (1991) describes as “policies without publics”—low-salience policies that attract little public attention, and that address problems with diffuse impacts, such that there are weak incentives for interests to mobilize. Unlike other issue areas, in which coalitions of interests compete to influence policy choices, policy design in the world of policies without publics is dominated by “technical experts acting on their sense of the public interest, not by interest groups or elected officials acting on behalf of public demands for improved policy” (Birkland, 1998: 67). Indeed, the predominant depiction of adaptation policy development in the existing literature is an “inside-initiated” process, whereby a champion recognizes the need for adaptation and works to assemble background information to attract the attention of decision makers (e.g., Penney and Wieditz, 2007; Dannevig et al., 2013).

Timing matters in agenda setting, and scholars have long referred to “policy windows” as key moments when decision makers are particularly receptive to proposed solutions (Kingdon, 2003: 166). Policy windows typically open after “focusing events”—relatively rare occurrences, such as a crisis or disaster that suddenly and rapidly attract attention to a problem and signal the need for corrective action (Birkland, 1997). For adaptation policy, extreme weather events appear to have this focusing power, in that their negative impacts foreshadow potential future harms associated with climate change. In Toronto, Canada, for example, policy makers used a severe summer storm in 2005 to focus attention on the need to adapt to climate change risks (Henstra, 2012). Similar issue-attention dynamics have been observed in other states, such as Norway (Dannevig et al., 2013), Sweden (Keskitalo, 2010) and the United Kingdom (Penning-Rowsell et al., 2006). However, we cannot assume that all adaptation policy making follows this reactive, event-driven pattern, and further comparative analysis is required to understand other ways in which adaptation makes its way onto the policy agenda.

3.6.2 Framing the problem

Policy problems are complex and subject to multiple interpretations. The way in which a problem is framed—how it is perceived by the public and policy makers—influences the sense of urgency to correct it, the interests that mobilize around it, and the

type and range of solutions proposed (Dery, 1984; Spector and Kitsuse, 2001). Frames influence the priority that policy actors place on certain interests and goals and point them toward causal and normative judgments about appropriate courses of action (Bleich, 2002). Problem frames comprise several interrelated elements, including: (1) the “world view” characteristic of a given society or community, which encompasses broad normative beliefs about what can and should be; (2) more specific policy related principles that bound the scope of legitimate state intervention in a particular policy field (e.g., liberty vs. security); and (3) operational considerations about the means by which objectives should be achieved, which constrains the choice among policy instruments (Surel, 2000). Problem framing is also political, in that actors often deliberately frame problems in a way that advances their interpretation of their causes and effects, and directs public authorities toward their preferred course of action (Stone, 1989).

Climate change adaptation is commonly framed in at least four different ways (Dupuis and Knoepfel, 2013; McEvoy et al., 2013). A hazard frame emphasizes the future threat that climate change poses to people and property, in addition to natural variability, which must be addressed through disaster management programmes. A risk frame regards climate change as a source of potential but uncertain risk, which can be managed by estimating the probability and impact of various manifestations, such as extreme temperatures. A vulnerability frame regards climate change as one of many stresses on communities and focuses attention on reducing the core determinants of vulnerability, such as poverty, poor health, and inequality. A resilience frame emphasizes a community’s capacity to absorb climate change-related stresses, recover quickly from system failures, and learn from experiences by reflexively adjusting practices to reduce vulnerability. These different problem frames have implications for the goals and means of adaptation policy, which could target general vulnerability, short-term climate change variability, periodic climate extremes, or long term shifts in mean conditions. Although the importance of framing has been acknowledged in some climate change research (e.g., Spence and Pidgeon, 2010; Morton et al., 2011), this crucial policy making function is deserving of greater attention in comparative analysis.

3.6.3 Engaging stakeholders and the public

Policy stakeholders are individuals, groups and organizations who are affected by the achievement of policy objectives, or who have the power or resources to affect policy development and implementation (Bryson, 2004). It is commonly argued that stakeholder support influences the political feasibility and perceived legitimacy of policy options, and that neglecting the concerns of stakeholders can lead to poor policy performance and often policy failure (van Horn et al., 2001; Wallner, 2008; McConnell, 2010). The policy making process is also believed to be enhanced by public participation (Irvin and Stansbury, 2004). Involving the public in policy development can serve a number of useful purposes, it is argued, including educating people about an issue, assessing social acceptability of policy options, and enhancing the democratic legitimacy of decisions (Walters et al., 2000).

In the context of adaptation policy making, stakeholder engagement involves identifying and collaborating with individuals and groups who will be significantly affected by climate change-related stress, or whose interests will be affected by adaptation policies (Conde and Lonsdale, 2004). Engagement is argued to be important because: (1) stakeholders possess specialized knowledge about climate change and offer valuable expertise; (2) it builds trust and strengthens the legitimacy of policy choices; and (3) stakeholder support expands the political salience of adaptation, providing an incentive for elected officials to devote attention to the issue (Tompkins et al., 2008; Sherman and Ford, 2014). Engaging the public is also argued to be important, because it can increase awareness of climate change-related risks, generate support for policy responses, and legitimize scarce resources allocated to adaptation planning (Few et al., 2007). However, the assumption that greater stakeholder engagement and public participation will lead to better policy is largely untested (Swart et al., 2014). Whether stakeholder and public involvement are desirable, and under what conditions they are effective, are outstanding questions that could be explored through comparative research.

3.6.4 Setting priorities

Faced with limited resources and many competing demands, local policy makers must necessarily prioritize which aspects of a problem to address and in what sequence. There is no standard method for defining policy priorities, and techniques differ across policy domains. In health policy, for example, priorities for resource allocation have typically been set based on historical spending patterns, which are adjusted to account for expected changes in service demand (Mitton and Donaldson, 2002). Moreover, priority-setting is a political activity, involving conflict over values and interests (Smith et al., 2014).

Priority-setting for adaptation policy development arguably begins with an assessment of current and future climate change-related risks (Jones and Boer, 2004). This involves identifying climate change hazards, evaluating their probability of occurrence, and estimating their potential magnitude (Deyle et al., 1998). It also involves assessing the community's current vulnerability to climate change hazards and projecting how this might change into the future (Füssel and Klein, 2006). This groundwork provides the basis for a risk assessment, which combines information on the likelihood and potential impacts of climate change hazards with socioeconomic data regarding the vulnerability of various groups (Jones and Boer, 2004).

Experts frequently recommend risk management as a decision support framework to identify and prioritize climate change-related risks and to select appropriate responses (Noble et al., 2005). Risk management is particularly useful for making decisions under uncertainty: through the use of alternative scenarios, analysts consider various outcomes, estimate their consequences, and assess benefits and costs of response options. Moreover, the risk management framework emphasizes continuous communication with stakeholders, to incorporate a broad range of interests and to ensure that proposed solutions are publicly and politically acceptable (Bruce et al., 2002; van Aalst et al., 2008). Some communities are moving beyond risk management, adopting other sophisticated measures, such as Bayesian inference, to evaluate the relative costs and benefits of adaptation interventions (Mathew et al., 2011). How and why local governments prioritize certain aspects of climate change, the relative priority they assign

to adaptation versus other needs, and their methods of determining the relative priority of alternative interventions are all subjects that could benefit from comparative analysis.

3.6.5 Formulating policy options

Policy formulation involves generating plausible policy choices to address a problem and assessing their feasibility (Wu et al., 2010: 29). Public administrators are typically the key actors, working in interdepartmental committees or task forces to develop policy alternatives. Operating within the strictures of political imperatives and available economic resources, policy makers employ techniques such as formal data analysis, stakeholder dialogue, and jurisdictional scans to identify potential courses of action and evaluate their relative workability and acceptability (Howlett et al., 2009: 111-113). Through this formulation process, choices are made concerning policy goals, targets, instruments and agents. The options ultimately presented to decision makers can vary in the extent to which they depart from the status quo. In most cases, policy alternatives represent small, incremental changes, because of the greater risk, uncertainty, and resource requirements associated with major policy change, but sometimes policy options deviate significantly from existing practice (Wu et al., 2010: 32-33). Drawing on the seminal work of Burton et al. (1993), McBean and Rodgers (2010) identified five broad, generic categories of adaptation policy options, including:

- Bearing and/or sharing the losses. This approach acknowledges the risk of climate change hazards and earmarks public resources to provide relief, rehabilitation, and reconstruction.
- Modifying the threat and/or preventing the effects. This category includes structural measures to contain climate change hazards and shield exposed assets, such as dykes to prevent flooding. It also includes actions to reduce sensitivity of people and systems to climate change-related stress, such as establishing “cooling centres” to provide relief from extreme heat, and disconnecting downspouts in order to reduce the load on storm sewer infrastructure.
- Changing use and/or location. Vulnerability can be reduced by changing activities in hazardous areas, or by moving populations and assets out of harm’s way. An

example of the former is a zoning regulation that permits only non-residential uses of land near waterways. Relocating residents who have experienced repeated flooding exemplifies the latter.

- Changing behavior. Some adaptation objectives, such as water and energy conservation, require behavioral change on the part of individuals and groups.
- Generating knowledge. Policy options in this category seek to generate information and intelligence to support adaptation.

There are various criteria by which public managers can evaluate and compare adaptation policy options. One consideration is technical feasibility, which refers to whether the necessary technology and expertise is available to effectively implement the policy alternative. Another is economic efficiency; that is, whether a proposed alternative represents an optimal use of scarce financial resources. Cost-benefit analysis is the prototypical tool for evaluating efficiency of policy options, and as Mendelsohn (2000: 585) argued, “adaptation is efficient only if the cost of making the effort is less than the resulting benefits”. A third criterion is social acceptability—the degree to which the chosen action is compatible with social values and beliefs. For example, in vulnerable coastal communities, difficult questions surround the social acceptability of “managed retreat”, which involves removing protective infrastructure and allowing certain lands to be flooded, in order to protect areas further inland (Jones and Clarke, 2014). Political viability is also important when considering policy options, meaning the extent to which the proposed action will be acceptable to elected officials, stakeholders, and other influential actors (May, 2005). Identifying likely proponents and opponents is an essential step in assuring decision makers that there is enough support to proceed and that the adaptation action can be defended to the voting public. Analyzing the sources of ideas, the actors involved in formulating policy options, and the criteria used to evaluate courses of action, can help to identify enabling conditions and constraints, and to draw lessons for adaptation policy development in other communities.

3.6.6 Generating political support

Political will—the collective willingness to take a course of action—is critical to policy success, particularly among actors with the authority or capacity to approve,

implement, and enforce public policies (Post et al., 2010). Political barriers to policy adoption and implementation are many, such as ambiguous direction from elected officials, conflicting public preferences concerning policy solutions, and entrenched professional ideas and practices that are resistant to change (Wu et al., 2010). Assessing and building political support is therefore a key policy making function, which can involve mapping supporters and opponents of policy options, evaluating the incentives and disincentives decision makers face in adopting a particular option, and engaging stakeholders, implementation agents, and the broader policy community to generate buy-in for proposed courses of action (May, 2005).

Political will is regarded as an essential enabling condition for local adaptation policy development (Wilson, 2006; Ford and King, 2013). But due to weak public interest, immediate costs but long-term, uncertain benefits, and many competing demands for resources, local elected officials are unlikely to perceive climate change adaptation as a pressing priority (Juhola et al., 2012; Hjerpe et al., 2014). Comparing climate change adaptation with other local environmental initiatives in Norway, Aall (2012) suggested that officials demonstrate to decision makers that specific adaptation actions have valuable co-benefits, in order to give them wider appeal and buy-in from diverse stakeholders. Officials could also emphasize adaptation as an imperative to address the spatial nature of integrated climate change risks, since many local activities are sustained by regional, national and global networks that are vulnerable to climate change. In addition, Henstra (2012) found that policy makers in two Canadian municipalities successfully generated political support by associating adaptation with other popular community values, such as sustainability and livability. However, there remains limited research evidence about the strategies that local officials use to generate political support for climate change adaptation, and this is an important subject for comparative analysis.

3.6.7 Policy integration

In policy studies literature, implementation typically refers to specific actions taken to put policy objectives into effect. However, implementation can also involve efforts to entrench a particular social value as an overarching lens through which subsequent proposed laws, policies and programs are evaluated, a process commonly

referred to as ‘mainstreaming’. For instance, over many decades a robust policy discourse has evolved around gender mainstreaming, which advocates analysis of the impacts of government decisions and actions on women and men to ensure inequality is not perpetuated (True and Mintrom, 2001). A related concept is policy integration, which appears most notably in the context of environmental policy, referring to the principle that environmental, social and economic policies must be integrated in order to achieve sustainable development (Lafferty and Hovden, 2003).

It has been argued that to be robust and durable over time, adaptation principles and objectives must be integrated into day-to-day planning and decision making processes (Bouwer and Aerts, 2006). This mainstreaming institutionalizes climate change adaptation as a social lens for decision making, in order to enhance policy coherence by minimizing duplication and ensuring policies are not working at cross-purposes (Kok and de Conink, 2007). For example, at the local level, adaptation principles could be integrated into official community documents, such as vision statements, strategic plans, development guidelines, sustainability strategies, by-laws, regulations and infrastructure asset management plans. Since climate change presents risks for many municipal services—water, public health, emergency services, energy, parks and recreation, and so on—mainstreaming could also be achieved by integrating adaptation into the job descriptions and performance evaluations of the agents responsible for these sectors.

Comprehensiveness, aggregation and consistency have been highlighted as key objectives for mainstreaming adaptation (Rauken et al., 2014). Comprehensiveness refers to how well climate change adaptation is integrated as a guiding principle, both horizontally (e.g., through a cross-sectoral strategy) and vertically (e.g., as a central objective within specific policy sectors). Aggregation means the extent to which adaptation is a joint, collaborative endeavor among different sectors, in order to aggregate knowledge and facilitate a coherent, coordinated approach. Consistency refers to the degree of complementarity or contradiction between adaptation policy and other sectoral policies. Institutional mechanisms to facilitate mainstreaming include the creation of a dedicated administrative unit, a staff position specifically devoted to shepherding climate change

initiatives, or an interdepartmental steering committee tasked with integrating adaptation into existing policies and programs (Penney and Wieditz, 2007; Krause, 2012).

However, policy integration is hampered by institutional constraints—particularly the functional fragmentation of complex, contemporary governments, and poor vertical coordination between levels of government—as well as political barriers, including weak leadership and ideological resistance (Jordan and Lenschow, 2010). As such, mainstreaming adaptation policy is an ideal that appears difficult to implement in practice (Pasquini and Ziervogel, 2013; Wyborn and Dovers, 2014). Moreover, the integration of adaptation with other policy fields appears to vary from one jurisdiction to another (Groven et al., 2012), which emphasizes the need for comparative research that can build contextual knowledge about whether and how adaptation is mainstreamed into broader governance processes.

Public policy making is a complex and fluid activity involving many different actors and activities. In this section, we have highlighted seven key policy making functions that commonly appear in both policy studies scholarship and adaptation research, and these elements present promising objects for comparative adaptation policy analysis. Although these are only some aspects of the policy making process, they serve to bound the scope of comparative inquiry in order to direct research attention to critical activities that are likely to vary from one jurisdiction to another. The next section briefly outlines methods that could be employed for comparative analysis of local adaptation policy.

3.7 Methods for Comparative Local Adaptation Policy Analysis

In light of the common and recurring message in adaptation literature that policy choices are influenced by the context in which they are made, we propose a research design based on comparative case studies, which can be used both deductively (to test theoretical propositions) and inductively (to generate testable propositions). A detailed blueprint for comparative case study analysis is beyond the scope of this paper, so our intention here is to point out the potential that it offers and identify relevant sources of information, in hopes of stimulating interest among researchers.

A case study is an empirical inquiry that investigates a phenomenon and its contextual conditions, which is typically guided by theoretical propositions and relies on multiple sources of evidence to triangulate data (Yin, 2003: 14-15). As a research method, the case study is particularly well-suited for the intensive study of a small set of units for the purpose of understanding a larger class of similar units (Gerring, 2004). The case study's strength lies in its ability to incorporate evidence from a variety of sources, including archival records, documents, interviews, and observations which providing for rich, thick description and analytic generalization. This is particularly true of a multiple-case, comparative research design, which employs within case and across case analysis to test theoretical propositions using a "replication logic" (Yin, 2003: 47). The various elements of policy content and the many policy making activities that comprise the policy process offer analysts a rich context in which to investigate hypothesized relationships between variables.

3.7.1 Comparative Case Studies

Comparative case studies can also be used for theory-building, whereby emergent patterns of relationships among constructs within and across cases are used to induce testable propositions (Eisenhardt and Graebner, 2007). Eisenhardt (1989) laid out a clear roadmap for building theory from comparative case studies, offering a step-by-step guide to question refinement, construct development, case selection, data collection and analysis, shaping hypotheses, and iterating between emergent theory and data. The method is well-suited for studying emerging policy fields like climate change adaptation, because analysts begin with only tentative constructs and potentially important variables before purposively selecting cases that are likely to replicate, contradict, or elaborate the emergent theoretical propositions. The key strength of this comparative, case-based and theory-building approach is that it produces measurable constructs, falsifiable hypotheses, and an empirically valid theory, because the propositions are intimately tied to empirical evidence (Eisenhardt, 1989).

3.7.2 Data sources

In both the deductive and inductive approach, there are many potential sources of evidence. For instance, content analysis—the systematic classification, organization, and examination of a body of text to interpret meaning and make inferences about patterns—is a rigorous method to study and compare written policy content, such as plans and strategies (Bowen and Bowen, 2008). Employing content analysis to compare municipal official community plans in the Canadian province of British Columbia, for example, Baynham and Stevens (2014) found that most contained relatively clear policy goals, but few included means for implementation.

Official policy documents, meeting transcripts, council minutes, reports of special-purpose bodies, committee papers, internal memoranda, consultants' briefs, archival records and media reports also provide rich sources of evidence, which can help to document aspects of the policy process. Data obtained through documentary analysis can be buttressed by semi-structured interviews with proximate policy makers and policy agents, such as local environment officials, planners, emergency managers and infrastructure administrators, as well as officials with broader responsibilities, such as elected officials and senior officers. Additional potential interviewees include stakeholders from sectors at risk from climate change, such as storm water management, health, urban design and insurance. For example, in a comparative case study of adaptation planning in eight Norwegian municipalities, Dannevig et al. (2012) used a mixed-methods approach that combined evidence from documentary analysis, a survey and elite interviews, noting significant variation in the scope and substance of adaptation policy among the communities.

When used in combination with other research techniques, focus groups can add research depth and breadth to the comparative, qualitative study of climate change adaptation policy, providing insights into the norms, beliefs, values and interests of policy makers and stakeholders (Short, 2006). Convening agents and facilitating group conversations (Morgan, 2004) can help to further explore contextual influences on adaptation policy choices and the factors that enable and constrain policy development (Ekstrom and Moser, 2013). In British Columbia, Canada, for instance, Picketts et al. (2013) brought

together city staff and community stakeholders to study downscaled climate change scenarios, prioritize impacts, and determine local adaptation priorities. This action-oriented approach gave the researchers first-hand experience in working through the barriers and challenges local governments face in developing adaptation policies (Picketts et al., 2012).

In sum, comparative case studies can be used to investigate factors that are believed to influence local adaptation policy choices and processes, and to induce theoretical propositions regarding variables that determine similarities and differences across jurisdictions. There are many sources of information to support comparative case studies, and there are various research tools that can be employed to collect evidence. Research designs that combine these techniques are better able to triangulate evidence and produce valid and reliable findings (Maxwell, 2004).

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Chapter Four

4 Adapting to Climate Change: Local Governance, Municipal Policy and Planning in Nova Scotia, Canada

Nova Scotia is the only province in Canada to mandate subordinate municipalities to complete ‘Municipal Climate Change Action Plans’ (MCCAPs) as a condition of continuing to receive financial assistance for infrastructure spending and community development projects through the valuable ‘gas tax’ funding mechanism (SNSMR, 2011). The gas tax-MCCAP policy mandate provides an important example of an adaptation policy instrument adopted by a higher level of government to monetarily incentivize adaptation policy making and planning for a lower level. The application and innovations of the MCCAP policy approach in Nova Scotia provide a unique case example of the initiating conditions required for instigating local climate change adaptation planning. The MCCAP case also provides an excellent opportunity for developing applied case study research methods for conducting adaptation case study analysis of the similarities and differences in how municipalities prepare adaptation plans and policies.

4.1 Introduction

Coastal areas exhibit higher sensitivity to the challenges associated with both long-term sea-level rise as well as shorter-term issues associated with adapting to changes in extreme marine weather events. Municipal local land-use policy and planning for climate change adaptation provide a potential vehicle for reducing the risks associated with coastal climate change impacts; for example, mitigating inland and coastal flooding due to extreme weather events through precautionary approaches to land-use planning and infrastructure development. This article describes a comparative case study analysis of how social and political factors shape municipal climate change adaptation policy and planning approaches, as illustrated in the case of coastal municipalities of Nova Scotia and the findings of focus group investigations in the province.

The province of Nova Scotia (45.0° N, 63.0° W) is an isthmus located on the east coast of Canada. Virtually surrounded by the sea, Nova Scotia is bordered by the Atlantic Ocean to the east and south, the Northumberland Strait and the Gulf of St. Lawrence to the north and the Bay of Fundy and the province of New Brunswick to the west. The population of Nova Scotia is 921,727 (2011), with 390,096 people residing in the capital city of Halifax (Statistics Canada, 2012). Halifax Regional Municipality is the largest and most populous municipality in the province, contributing significantly to both the provincial and Atlantic Canadian economy. The provincial government presides over 53 municipal governments in administering climate change adaptation planning and related policies and funding required for maintaining and developing local infrastructure such as water, wastewater and transportation.

Intentional, substantial and concrete climate change adaptation policy making case studies like Nova Scotia offer critical opportunities to both clarify conceptual adaptation policy approaches while advancing collaborative, applied research methods targeted at building theoretical and empirical knowledge of nascent regional and local-scale climate change adaptation planning and policies efforts (Dupuis and Biesbroek, 2013; Murtinho and Hayes, 2011). The purpose of this study is to further contribute to the advancement of descriptive, exploratory case study methods for generating knowledge and understanding of the initiating conditions for local-scale adaptation policy development, and, to develop grounded theoretical propositions about the variable social factors that may enable and/or constrain adaptation policy development at the local scale.

4.2 Global climate change impacts and local adaptation constraints

It is projected that global surface temperature change will exceed 1.5°C relative to 1850 by the end of 2100 as a result of increasing anthropogenic greenhouse gas emissions (IPCC, 2014). As a result of climate change, the reality of adapting to acute, near-term climate change impacts such as increasing variability in the frequency, severity and duration of extreme weather events impacting Canadian cities is increasingly apparent (e.g., Toronto and Calgary floods, 2013). In the coastal zone, addressing the chronic, long-term issue of continued and assured sea level rise, in combination with more

extreme weather events impacting on coastal settlements' land-use and infrastructure, presents a series of contextualized challenges for governance at multiple spatial and temporal scales (IPCC, 2014; Wheeler, 2011; McBean and Rodgers, 2010; Yamin et al., 2005; Burton et al., 2002; Smit et al., 2000). A report of the Institute for Catastrophic Loss Reduction (ICLR, 2012), commissioned by the Insurance Bureau of Canada summarized the changes projected by 2050 for Atlantic Canada and Nova Scotia. In particular, the report noted that intense precipitation will occur more often. For example, extreme precipitation events which now have a 1:20-year return period are projected to occur about every 1:10 to 1:15 years as a result of climate change. With the mean sea level projected to rise 15–25 cm by 2050 and an increase in intense tropical cyclone activity resulting from warming of ocean temperatures, the risks of more significant storm surges, extreme weather and coastal flooding in Nova Scotia are anticipated to occur in the future.

Amidst this climatic backdrop, some of the key social, political and governance challenges of interest for adaptation research include: multi-layered institutional constraints arising from cross-scale governance interactions, issues of scientific uncertainty in adaptation planning and policy making and developing better understandings of the complex social factors that affect adaptive capacity building at the local scale where climate change impacts are primarily experienced (Dickinson and Burton, 2011). It is the combined effect of both the local biophysical context of vulnerability to climate change hazards and impacts acting in concert with complex, cross-scalar socio-economic and political factors that in turn affect local capacities to adapt to climate change. These key influences also affect risk perception and prioritization, with ultimate implications for the sustainability of adaptation planning and policy implementation, and the efficacy and resiliency of climate change adaptation decisions, and planning and policy outcomes (Eriksen and Brown, 2011; Solecki et al., 2011; Birkmann et al., 2010; Ford, 2008).

Consequentially, this complex socio-ecological mixture of influencing factors have implications on the process of climate change adaptation policy development, risk prioritization and decision making at the local scale with implications for the resilience of

local communities' efforts to withstand, cope or thrive in the face of mounting climate change impacts (McBean and Ajibade, 2009; Cutter et al., 2003; Hewitt, 1997; Blaikie et al., 1994). These substantial policy making issues are poorly articulated in climate change adaptation research and provide the contextual basis for developing new case studies methods. Gleaning new insights from nascent processes of adaptation policy making requires developing and testing applied approaches for conducting comparative research into intentional, substantial and concrete climate change adaptation governance approaches, particularly at the local level (Dupuis and Biesbroek, 2013; Ekstrom and Moser, 2013; Ford and King, 2013; Murtinho and Hayes, 2011; Burch and Robinson, 2008; Adger et al., 2009; Bulkeley and Betsill, 2003).

Local governments are key actors in the formulation and implementation of climate change adaptation policies and case studies of local climate change adaptation policy making have proliferated in recent years. However, there is a need to generate empirical knowledge about local policy making processes in the context of adaptation governance in order to provide insights into the 'decisions, actors, processes, institutional structures and mechanisms...involved in determining a course of action' (Moser, 2009: 315). Contextualized vulnerability due to place-based exposure and sensitivity to climate change risks, and a close proximity to stakeholders and the public position municipalities as an appropriate focus for the development of tailored strategies to mitigate against climate change risks and impacts (Corfee-Morlot et al., 2011; Larsson, 2003). However, there are substantial challenges facing local adaptation policy development, including institutional and structural governance barriers (Ford and King, 2013; Ekstrom and Moser, 2013).

Adaptation planning and governance must address the unique local contextualization, social construction and prioritization of climate change risks, hazards and vulnerabilities in order to adapt and build resilience to current and projected climate change impacts (Burch, 2010; Burton, 2007; Eriksen and Kelly, 2007; Cutter et al., 2003; Kelly and Adger, 2000; Mileti, 1999; Cohen et al., 1998; Hewitt, 1997; Blaikie et al., 1994). However, adaptation planning and governance challenges frequently result from a number of factors including: multi-layered institutional constraints and cross-scale

governance interactions (e.g., conflicting institutions and unclear policy jurisdictions), issues of scientific uncertainty (e.g., imperfect climate science and complex systems), science and knowledge translation into policy (e.g., the abilities for government to support and integrate science-based decision making related to climate change), and the normative behavioral and cognitive aspects of risk perception and decision making occurring multiple and interconnected levels (e.g., individual and collective aspects of “human nature”) (Eriksen and Brown, 2011; Solecki et al., 2011; Birkmann et al., 2010, McBean and Ajibade, 2009; Fuchs, 2010; Wachinger and Renn, 2010). By inference, these constraints are overtly and covertly reflected in the adaptation policy process and the reflexively produced content of adaptation policies that occur through social processes of preparing climate change adaptation plans. These social constraints are poorly understood; yet, they have important implications for adaptation policy quality and policy outcomes, perhaps impacting the difference between resilience and maladaptation to local scale climate change impacts.

In Canada, local municipal governments play central roles in regulating land use, developing and enforcing building codes, providing critical infrastructure (e.g., water, waste-water, transportation) as well as undertaking emergency measures planning, management and response. There are significant local-scale and broader scale implications for designing responsive adaptation policy and planning processes. Developing structural governance architectures capable of addressing both near-term and long-term issues associated with adapting to climate change risks provides ripe opportunities for academic engagement. The ability of governments to respond and to mitigate near-term and long-term climate change impacts is well suited to the local scale. There is a corollary opportunity to co-beneficially address both adaptation issues and greenhouse gas (GHGs) emissions reductions through co-beneficial, integrated approaches in municipal policy areas such as transportation, and through efficiencies in building design and community land-use planning (Tusz-King, 2012; Bizikova et al., 2008; Mehdi, 2006; Auld and McIver, 2007). Ostensibly, it is arguable that adaptation to climate change also includes a critical role for the urgent mitigation of rising levels GHG emissions, as this is ultimately required to decrease the likelihood of future climate change risks and impacts (Pelling, 2011). In the long-run, GHG mitigation, it would

seem, is the best form of transformative adaptation. However, given the time lags in the global climate change system responding to GHG emissions reductions and the reality of mounting worldwide climate change impacts (coupled with the established, complex orthodoxy of globalized, fossil-fuel based economic growth), transformative system change towards sustainable and ecological development ('transformative adaptation') remains sparse, elusive and poorly understood.

While local municipalities shoulder much of the load in providing essential infrastructure and services to communities, such as transportation, storm-water management and waste-water infrastructure, as well as emergency management, not all municipalities are equally capable, and in many cases, municipalities operate under resourced and under capacity. To illustrate this, the Gulf of Maine Council on the Marine Environment has released findings from a survey of 33 Canadian and American municipalities in the Bay of Fundy region (Schauffler, 2014). Statistically significant among the survey results were the identification of constraining factors on municipal climate change impact preparedness. These factors included: lack of resources, lack of public concern and political will, and a desire for local efforts to be supported by higher levels of government in order to accelerate local adaptation efforts. These findings are consistent with field work from the San Francisco Bay area by Ekstrom and Moser (2013), who found that institutional governance issues, decision makers' attitudes, values and motivations (e.g., lack of interest, status quo mindset, inability to accept change, narrow self-interest) and lack of resources and funding were the predominant barriers facing local climate change adaptation integration.

Climate change may be a poorly understood problem at the local scale for multiple reasons and relying on independent municipal policy making actions to realize the intangible, fragmented and uncertain benefits of adaptation can often be difficult to autonomously induce. Reconciling the short-term realities of municipalities' scarce financial resources, lack of human resource capacity, lack of expertise and knowledge and muted public demand, are but a few of the many challenges confronting municipal decision makers tasked with devising strategies for adapting to climate change (Wagner and Zeckhauser, 2012; Reisinger et al., 2011; Simonsson et al., 2011; Measham et al.,

2011; Lorenzoni and Pigeon, 2006). Further conflicting progress on adaptation at the local scale are unclear aspects of cross-jurisdictional policy responsibilities across and between governance institutions, and the related complex issues associated with appropriately defining policy scale and scope, and assigning institutional policy responsibility for climate change adaptation actions (Adger et al., 2009; Görg and Rauschmayer, 2009; Unwin and Jordan, 2008; Gupta, 2007).

The remainder of the article describes the exploratory case study research approach and the findings of a descriptive case study analysis of ‘Municipal Climate Change Action Plans’ (MCCAP) based on focus groups conducted in Nova Scotia, Canada.

4.3 Research design

Case study research designs for conducting adaptation policy research in empirical settings remain poorly articulated and present new opportunities for methodological innovation (Vogel and Henstra, 2015, Ford and Berrang-Ford, 2014). Currently, there is a dearth of methodologies and lack of consensus on analytic frameworks for studying local adaptation governance responses to climate change impacts (Ford and King, 2013; Bassett and Shandas, 2010). Empirically driven, applied policy analysis and new research approaches that assess the robustness of existing policy and planning frameworks against inductively and deductively constructed conceptual research frameworks have the potential to advance how adaptation and resiliency are theorized, and adaptation policy design is practiced (Vogel and Henstra, 2015; Birkmann et al., 2010). This type of research design may offer new insights into the ‘soft underbelly of adaptation decision making’ through comparative case studies that contribute to advancing adaptation theory, policy and practice (Moser, 2009).

Mixed methods research designs are useful for further developing grounded theories about environmental risk (Baxter and Eyles, 1999; Baxter and Eyles, 1997). Specifically policy analysis of local-scale case studies of climate change adaptation processes can benefit from advancing comparative research designs (Burnham et al., 2004). The approach utilized in this descriptive, exploratory case study utilizes a top-down, deductive ‘theory-testing’ approach to explore the social factors that impact local scale

adaptation planning and policy-making processes (Ford and King, 2013). The research began with conducting focus groups with adaptation policy stakeholders as an interactive means of collecting and aggregating primary data in order to preliminarily identify and iteratively substantiate the relevant social factors plausibly enabling or constraining adaptation policy development at the local scale.

Case studies offer research opportunities for attaining conceptual validity and deriving new hypotheses about the relationships between causal mechanisms through methods of heuristic inquiry. A case may be defined as an instance of a class of events (George and Bennett, 2005). Focus groups explored stakeholder perceptions on topics related to the multi-level governance of municipal adaptation planning, to develop knowledge of the social factors impacting the MCCAP development and implementation.

George and Bennett (2005:18) suggest that rigorous case study research design may include both within case and comparative use of a small number of across cases in order to have ‘the strongest means of drawing inferences from case studies’. The focus groups generated ‘within MCCAP’ case aggregated findings that were subsequently iteratively tested using an online survey. Refined focus group / survey results then were narrowly considered at the individual case level of MCCAP adaptation planning in three municipalities, to provide illustrative depth and context to aggregate breadth results. The larger MCCAP case study combines within case and across-case comparisons in the design of an experimental comparative adaptation case study research approach for advancing methods of understanding the social factors that impact local climate change adaptation case contexts.

Of course, case study methods may be critiqued for case ‘selection bias’, and research issues associated with defining the scope of the case, identifying dependent variables across case comparisons, as well as issues associated with the weighting and measurement of comparative variables hypothetically acting as causal mechanisms and serving as the premise for theory development. As such, it appears that navigating the map of local adaptation case research requires the application of mixed methodologies to identify the comparative factors affecting adaptation processes in case settings and, in

particular, to develop research designs that drive inquiry into the social and political mechanisms causing variation in policy content and process between cases.

Vogel and Henstra (2015) assert that much of the adaptation case study research to date has been in the form of single case studies, which, while descriptive and informative, have limited applications beyond knowledge accumulation. Concurrently, the research methods employed to specify and operationalize the meaning of “adaptation policy” as a unit of analysis lack transferability between cases and thus have generally been inadequate to facilitate a focused comparison of the influencing factors that enable and constrain adaptation at the case level. By combining research and analytic frameworks to focus on identifying the salient features of adaptation policy in concrete, intentional, substantial adaptation case environments, there is a critical opportunity to identify the salient features of local adaptation policy initiation and the correspondent barriers and opportunities for enabling effective and responsive adaptation policy frameworks.

Adaptation policy research offers an exciting opportunity to develop and test the veracity of conceptual propositions related to adaptation policy initiation and the seen and unseen factors that contribute to enabling and constraining adaptation planning and policy making. As Sayer (2000:58) notes, ‘any question about concepts must take into account the empirical circumstances in which they are used’. Developing comparative case methods offers an opportunity to develop and test grounded theories to develop ‘...an understanding of the context-dependence and contingencies of creating meaning in the world’ (Sayer, 1984:59-60).

Through critical, comparative inquiry into the differences and similarities of adaptation policy processes and the variability in the actions and perceptions of stakeholders, there is an opportunity to produce ‘explanatory interpretation of outcomes’ of the various causal factors contributing to comparative differences and/or similarities across cases (Sayer, 2000). Thus, comparative research has practical implications for better understanding the enabling and constraining factors that affect the opportunities for developing robust climate change adaptation policy frameworks. Further, combining inductive tools and

deductive inquiry provides a robust methodological foundation for conducting adaptation participatory policy research that engages with research stakeholders.

This research design began with developing a conceptual research framework consisting of eleven functional policy questions pertinent to comparatively analyzing the development of MCCAPs' plan content and adaptation stakeholder perceptions of the MCCAPs' policy process (Vogel and Henstra, 2015). These functional policy making questions provided a set of 'heuristic' interactive tools for comparatively and categorically describing the Nova Scotia adaptation policy making process at inter-related provincial and municipal case scales of climate change adaptation policy making and governance. Section 4.4 operationalizes these questions to briefly describe the provincial context and background that led to the emergence of the MCCAP policy in Nova Scotia. Methodologically, these questions assisted in deriving empirical findings from the content of MCCAPs, as well guiding primary inquiry into the policy processes utilized to develop the MCCAPs with adaptation policy stakeholders. Content analysis and methods of primary data collection with adaptation policy stakeholders were utilized to facilitate within case and across case comparisons of adaptation planning and policy making in Nova Scotian municipalities (See Appendices B1-B4).

4.4 Setting the MCCAP agenda: Focusing events and policy development in Nova Scotia

In Nova Scotia, vulnerability, exposure and sensitivity to climate change hazards and impacts were clearly illustrated in the case of Hurricane Juan in September 2003. The province, and in particular the city of Halifax, endured a total of 200 million dollars of damages from the Category Two storm with impacts that included: power outages, falling trees and extensive property damage to buildings, as well as impacts on coastal infrastructure as a result of flooding of the Halifax waterfront. Juan also led to the direct and indirect loss of eight lives throughout Nova Scotia (Avila, 2003). In the wake of this historical 'focusing event' (Kingdon, 2003; Birkland, 1998), a process of provincial adaptation policy development was catalyzed that ultimately resulted in a provincial policy mandate requiring 'Municipal Climate Change Action Plans' (MCCAPs) to be completed by all 53 municipalities. Central to this process was climate change risk

management policy development in the provincial capital, Halifax. Henstra (2012) has described Halifax as a leader in climate change policy innovation, being the first city in Canada to undergo a comprehensive risk management strategic planning exercise for climate change impacts in the wake of Hurricane Juan (e.g., HRM ClimateSMART, 2007).

In Canada, MCCAPs are a policy instrument and mechanism unique to Nova Scotia, making the province an innovator in climate change adaptation policy development among Canadian provinces. Under the terms of the 2010-2014 municipal gas tax transfer agreement, the MCCAP policy mandate required all the municipalities of the province to prepare and complete MCCAPs by January 1, 2014 (SNSMR, 2011). Nova Scotia is the only province in Canada to adopt this monetization of adaptation planning approach.

Briefly, as historical background of the MCCAP policy mandate, the Canadian national ‘New Deal for Cities and Communities’ (enacted by Paul Martin’s federal Liberal minority government in 2005) and the subsequent federal-provincial gas tax transfer agreement provides an ongoing multi-level governance policy framework for the transfer of federal gas tax revenues (collected from national excise tax on the sale of gasoline), back to Canadian municipalities via provincial infrastructure secretariats (FCM, 2013). The gas tax serves as an important and reliable municipal revenue stream to support investments in municipal scale infrastructure such as: transportation, water, waste water, energy or other projects (Connelly et al., 2009). During the first phase of gas tax, the mandatory completion of Integrated Community Sustainability Plans (ICSPs) was required by all Canadian municipalities from across the country in order to continue to receive gas tax transfer funding. Nova Scotia is the only province to build on this policy framework by leveraging the gas tax transfer as a financial incentive to require mandatory municipal climate change adaptation planning and GHG auditing as a reporting requirement for the continuation of gas tax funding.

As this brief case history illustrates, there were a number of variable climatic and non-climatic factors at play that ultimately led to the development of the Nova Scotia MCCAP policy process and the implementation of the MCCAP policy mandate,

necessitating further interactive research approaches to assess the social impacts of the MCCAP process at the municipal scale.

4.5 Focus groups

Four focus groups were conducted in Nova Scotia, Canada with 35 municipal adaptation stakeholders in the fall of 2014. Focus group participants were invited from municipalities' staff, council and regional emergency measures organizations (Appendix E1). As well, participants were recruited from non-governmental organizations (NGOs), provincial government departments and academia. Stakeholders included 23 municipal participants (employees and/or elected representatives) from 14 municipalities (nine Counties and five Towns); as well as participants from NGOs (two), academia (six) and the provincial government (four). Of the municipal employee representatives, the largest numbers of participants were land-use planners (n=ten) while the majority of municipal political participants were municipal councilors (n=five). Two mayors and one warden attended the focus groups in addition to two regional emergency managers, one water utility manager and one chief administrative officer (CAO). The 35 focus group participants interactively discussed and probed the variability in municipal planning processes related to how climate change risks were identified and prioritized, while queries about the enabling and constraining conditions for MCCAP implementation at the municipal scale were also addressed (Appendix E2). The regional focus group locations were selected based on a shared attribute of high sensitivity to sea level rise (Shaw et al., 1998).

4.6 Focus group findings

The focus groups opened with a general introduction to the research study, followed by three rotating discussion groups on the broad topics of strategic municipal policy development, inter-governmental collaboration and academic collaboration in relation to the MCCAP process. Focus group participants were asked to first individually complete the discussion topic worksheets and then to work in small groups to further discuss their answers. Following the completion of the three rotating discussion groups, the focus groups ranked discussion questions for synthesis discussion using a dot voting

exercise. The top ranked questions were then discussed as a large group. These focus group results were then synthesized for further analysis in relation to the functional policy questions.

4.6.1 Setting the agenda: How did adaptation policy/planning arise on the agenda?

The MCCAP policy instrument was developed and implemented by the province of Nova Scotia's Department of Municipal Affairs (DMA), formerly Service Nova Scotia and Municipal Relations (SNSMR). As previously discussed, the MCCAP exhibits a hierarchical governance policy making framework meant to incentivize climate change planning for municipalities through the use of a provincial policy instrument that combined the financial leverage of the gas tax transfer payment with penalization for non-compliance (withholding municipalities' gas tax funding). Municipalities were provided with an MCCAP guidebook in 2011 describing how to prepare the plan that was due by 2014. In addition, municipalities were provided with supplementary MCCAP training and capacity building tools and services to assist them as they prepared their individual MCCAPs throughout 2011-2013.

Based on 19 participant responses, 18 focus group participants identified the gas tax incentive as the main driver for the completion of the MCCAP, with 15 participants noting that the MCCAP was unlikely to have been prepared without the gas tax funding incentive. Participants described the gas tax as 'the primary reason', 'very important', the 'main incentive', 'the motivation' and the 'major driver'. While 4 participants felt that the MCCAP might have occurred without the gas tax, the conditionality of gas tax transfer dependent on the completion of the MCCAP was generally well-received by participants. In the words of one participant:

The province was smart in requiring MCCAPs in order to continue to receive gas tax. That said, we were doing much of this work already simply as it's good sense (Focus group 2: September 17 2014).

This finding directs attention to the important influence that multi-level governance policy instruments like the MCCAP can play in setting the agenda and defining the scope and scale of climate change planning for local governments. In the case of Nova Scotia,

these findings provide strong evidence that the monetization of adaptation planning using the gas tax was the key factor that enabled local stakeholders to initiate climate change adaptation planning and policy development.

4.6.2 Agents: Who is allocated responsibilities to prepare and implement the adaptation policy/plan?

Content analysis and review of 22 MCCAPs in the four high sensitivity coastal regions of Nova Scotia where the focus groups were conducted revealed that 11 municipalities in the sample prepared the MCCAP through retaining a consultant while eight municipalities collaborated with academia. Further, the average size of the MCCAP committee delegated to prepare the plan was eight to nine people, with an average of two of the committee members consisting of municipal political representatives. However, only six of the plans sampled had high-level political representation in the form of a mayor or warden and four plans had no political representation at all on the MCCAP committee whatsoever.

The focus group discussion topics related to inter-governmental collaboration and municipal policy development addressed policy research questions related to MCCAP preparation and implementation. Based on 20 responses, all focus group participants identified vertical governance collaboration with the provincial government as relevant to the preparation and completion of their MCCAP while only two participants identified the federal government as relevant. Focus group findings further indicated that provincial government departments with shared policy jurisdictions relevant to municipal land-use planning and infrastructure (Municipal Affairs, Transportation, Natural Resources, Environment and Agriculture) were also commonly identified as relevant to the MCCAP development. Eight focus group participants described vertical collaboration with higher levels of government as ‘very little’, ‘too late’, ‘minimal’ and/or ‘unhelpful or unsupportive’. Equally, another eight participants described vertical collaboration as ‘excellent’, ‘instrumental’, ‘supportive’, ‘collaborative’ and/or ‘helpful or useful’. Some of the important reasons for MCCAP collaboration with higher levels of government offered by focus group participants included: information provision, funding, mapping, expertise; shared policy jurisdiction for planning and funding roads, coastal defenses

(sea-walls) and regulating coastal zone land use (wetlands, marshlands, dyke lands); as well as a municipal reliance on the province for the provision of planning guidelines and guidance through seminars, websites, education and training.

With respect to MCCAP initiation and plan development at the municipal level, based on 20 responses, 12 focus group participants identified that internal, horizontal, inter-departmental collaboration provided the basis for developing the MCCAP, while eight of the focus group participants identified staff and council collaboration as the basis for developing the MCCAP work plan. Seven of the focus group participants also further identified the provincial MCCAP guidebook template as the basis for developing the MCCAP, while three participants identified the retention of an external consultant as the basis for MCCAP development.

Based on 21 focus group participant responses, seven participants identified regional emergency measures organizations as the primary means for inter-municipal collaboration on MCCAP preparation, while six participants identified very little or no inter-municipal collaboration. Outside facilitation through shared consultants (three participants) academic research collaborations (two participants) or non-governmental organization facilitation (three participants) were also identified. Ten participants identified shared interests in infrastructure, mapping, information and/or planning as the dominant reasons for horizontal collaboration with other municipalities, while four participants identified differences in relationships and priorities (e.g., urban/rural divide, past history of amalgamation) as barriers to horizontal collaboration.

These findings related to the agents involved in the preparation and implementation of MCCAP provide examples of both the common and differentiated roles and responsibilities across levels of government, and also within local government, for the preparation and implementation of the MCCAP. The evidence suggests a common need for collaboration and communication both within government and between government departments and institutions in order to prepare and implement the MCCAP, given shared policy jurisdictions and common policy interests. The evidence suggests that there exist

significant challenges and opportunities for collaboration and communication on cross-jurisdictional issues associated with municipal climate change adaptation.

4.6.3 Framing the problem: How is the adaptation policy/planning problem framed?

The MCCAP guidebook template provided by the DMA set the framing of the adaptation policy problem, provincially. The guidebook (SNSMR, 2011:2) described that:

Simply put, adaptation is all about understanding climate change impacts and effects, in order to undertake substantive actions that make communities and municipal investments more resilient to the harmful effects of weather and climate. In addition, actions undertaken may also capitalize on any positive long-term opportunities that will result from these changes.

Early adoption of policies on climate change will help to develop a strategic approach to determining where to best focus municipal efforts, resources and new infrastructure expenditures. Planning for climate change helps to make decisions more cost-effective and also helps to guard against unforeseen and burdensome costs.

These excerpts from the guidebook (Appendix B2) provide strong evidence that the framing of the municipal adaptation policy and planning problem was targeted at developing increased municipal awareness in order to facilitate proactive actions for efficient, strategic policy development and implementation, with the goals of achieving sustainable and resilient outcomes while minimizing climate change impacts related damages and costs. The MCCAP guidebook also provided municipalities with a pragmatic six-step planning framework to identify impacts and hazards and affected locations, facilities and infrastructure at risk due to climate change, in addition to identifying social, economic and environmental considerations of interest to determining the priorities for adaptive actions. This planning template summarized that the six-step framework (SNSMR, 2011:2) was targeted at helping municipalities:

...understand where impacts are already being felt, where you might expect them to occur in the future, what parts of your municipality are vulnerable, who might be affected, what kinds of actions are required, and where they will be applied.

To further contextualize the problem framing process, the focus group discussion topic pertaining to academic collaboration provided further insights into the process of how adaptation was framed in the MCCAPs. Based on 19 responses in the focus groups, ten

participants identified that there was academic collaboration, with one participant highlighting that it played a major role in the MCCAP development. Conversely, several of the participants also described that there was ‘very little’ academic collaboration, indicating a lack of time for academic collaboration, while others indicated that there was no academic collaboration at all.

In cases where there was academic collaboration, focus group participants identified the key roles played by academia in the preparation of the MCCAPs as: research; information provision; consultation; mapping; and erosion and coastal vulnerability studies and assessments.

In addition, academics provided knowledge resources through participation in the adaptation planning process. Participants highlighted the benefits of academic collaboration in relation to providing service-based information, with key roles for facilitation of community climate change planning processes, including through student research projects. Participants indicated that academics play a valuable role in providing knowledge and capacity resources to interpret, translate and utilize climate change data in order to inform risk issues and prioritization processes for municipal adaptation planning. Participants noted that academic research and analysis of the processes and the presentation of meaningful results can benefit municipalities with capacity constraints related to access to the knowledge required to undertake comprehensive climate change risk management and adaptation planning.

Participants further indicated that academia could provide access to larger knowledge networks, which was perceived by participants to potentially provide a means of supporting robust municipal climate change risk and adaptation decision making. Some participants also perceived academic collaboration as a more-cost effective solution than hiring consultants to prepare the MCCAP.

Some examples of adaptation research partnerships and projects identified by participants included: the Partnership for Canada-Caribbean Community Climate Change Adaptation (ParCA: <http://parca.uwaterloo.ca>), the Atlantic Climate Change Adaptation Solutions Association (ACASA: <http://atlanticadaptation.ca>), as well as collaborations with the

Applied Geomatics Research Group Centre for Geographic Sciences (<http://agrg.cogs.nsc.ca>), in Middleton, Nova Scotia. Participants also mentioned research partnerships with provincial universities such as Saint Mary's University, Dalhousie University, St. Francis Xavier University and Mount Allison University.

More than half of all the focus group participants affirmed that academia has a role to play in providing decision support to municipalities, while some said there might be a role and several felt that there was not a role for academia. Participants highlighted that, going forward, academic collaboration is important for supporting municipal climate change adaptation decision making and implementation for three key reasons:

1. Implementation of MCCAPs may be complex;
2. Academia provides non-biased, external research, information and knowledge that provides further credibility to risk prioritization and adaptation planning;
3. Academic research and knowledge can play a supportive role in facilitating adaptation planning processes and the implementation of policy initiatives.

Participants indicated that further research is required to identify adaptation solutions based on factual information for council, staff decision making and corollary community buy-in to adaptation policy, planning and projects. Participants offered that academic research provides evidence to contextualize information and support best-practices for municipal decision making and actions, grounded in contextualized local vulnerability and adaptation realities of Nova Scotia municipal governments.

These findings suggest that there were multiple points of problem framing in the case of Nova Scotia municipal adaptation planning, with the MCCAP guidebook being a central point for framing the climate change adaptation policy problem. The strong role for problem framing occurring in the form of academic collaboration was further evidenced in focus group participant responses.

4.6.4 Setting priorities: Is there an explanation of the way in which priorities are set?

From content analysis of the MCCAP plans (n=53 municipalities / n= 40 plans), Reeves (2014) found that the 67% of Nova Scotia municipalities ranked hurricanes and high winds as a high risk climate change impact; while 60% ranked storm surge and sea-

level rise as high risk and 61% ranked in-land flooding and heavy precipitation as a high risk climate change impact. These content analysis findings indicate that the majority of Nova Scotia municipalities perceive themselves to be at a high risk due to climate change impacts, as documented in their MCCAP plans.

Focus group participants identified hazard, risk and vulnerability assessment criteria development and ranking/rating systems and/or risk tolerance matrices as key methods used to prioritize climate change risks and impacts. Further methods discussed by participants included: committee round table discussions, staff knowledge and input as well as council input, flood risk mapping and visualization (LiDAR mapping). Asset mapping and risk assessment were also discussed. Key outcomes of these prioritization processes included the identification of public safety priorities and critical infrastructure concerns; an increased awareness of proximity to climate change hazards (e.g., storm surge, erosion, inland flooding); and the identification of cross-jurisdiction policy concerns. In one municipality, the MCCAP committee was re-established to carry forward with developing an ‘action plan’, while in another municipality the MCCAP informed the development of a municipally led coastal management strategy.

These preliminary findings indicate that MCCAP priorities were set according to standardized risk assessment processes, however there was some level of variation between municipalities in terms of the tools, resources and practices utilized to assess and prioritize climate change hazards and risks, suggesting further investigation is warranted.

4.6.5 Formulating policy options: how were adaptation planning and policy options were formulated?

While the formulation of municipal policy options was contextual to individual municipalities’ planning processes the MCCAP guidebook initiatives’ (SNSMR, 2011:5) suggested that:

Climate change adaptation is a matter of risk management and good governance; and at the local government level, there are several key areas of municipal influence where adaptation can begin:

Licensing and Regulation – Municipalities can use their powers to set the local regulatory environment in conjunction with their ability to enforce regulations, to implement and enforce adaptive policies.

Facilitation, Advocacy, Leadership and Public Education – Municipalities can use their close contact and relationship with community organizations, businesses, residents and other stakeholders at the local level, to develop a shared understanding of the issues and to develop collaborative responses to climate change.

Service Delivery, Community Development and Civic Engagement – Many of the services provided by municipalities for businesses and residents can be reviewed in light of adaptive climate change

Based on 21 responses, the majority of focus group participants identified regional emergency measures organizations as the top mechanism for horizontal collaboration, while sharing consultants and outside facilitation through academic research projects and/or NGO facilitation of cross-jurisdictional concerns were also identified as means of horizontal collaboration. However, some participants also identified that there was little or no horizontal collaboration with neighboring municipalities, citing differences in urban/rural relationships and adaptation priorities as the reasons why little or no collaboration occurred.

From a review of the top adaptation priorities listed in four MCCAPs prepared through regional collaboration by 12 municipalities, the following commonalities were identified:

Licensing and Regulation: Two MCCAP priorities provided examples of the need for flood elevation planning and integration into land-use plans and regulations.

Facilitation, Advocacy, Leadership and Public Education: Eight MCCAP priorities provided examples of the need for inter-governmental collaboration on issues of policy jurisdiction and coastal climate change risks; mapping and weather data access; as well as the needs for shared municipal collaboration on infrastructure funding. Further priorities also identified the shared needs for providing emergency planning and response, as well as the need for developing land-use planning regulatory uniformity and reform across municipal boundaries. Additional shared needs for ongoing public education with respect to climate change adaptation and emergency preparedness were also identified.

Service Delivery, Community Development and Civic Engagement: Two MCCAP priorities provided examples of the need for long-term integrated approaches to addressing climate change risks related to water resources as well as the need for community-based approaches to tracking climate change impacts.

From this brief review of MCCAP regional priorities, the evidence suggests that facilitation, advocacy, leadership and public education on matters of climate change adaptation presents multiple opportunities for better enabling MCCAP implementation at the local scale and this policy integration theme is worthy of further case study analysis.

4.6.6 Generating political support: Was political support important to adaptation policy development?

Focus group participants described inter-departmental staff and council collaboration as ‘important’, ‘essential’ and ‘critical for bringing all the necessary knowledge and experience together’ in relation to the MCCAP development and prospects for future implementation. One participant further described inter-departmental staff collaboration as:

...Ongoing – we are just now coordinating our regional emergency management plan with our MCCAP, [we are] collaborating with [the municipal Department of] Public Works throughout the process and developing annual work/implementation plans ([in order to achieve] financial support at budget time with public education around the issues) (Focus group 3: September 22 2014).

Focus group participants described staff/council relations in MCCAP development and implementation as ‘very important’ and ‘essential’. One participant highlighted that:

...Staff/council need to integrate adaptation into day-to-day decision making especially with regard to infrastructure and storm-water... [we need to] keep working with external agencies/groups/municipalities on cross-jurisdictional issues... (Focus group 3: September 22 2014).

Another participant highlighted the mutual dependency of staff/council relations, noting that:

...Council’s plans are implemented by staff and successful implementation relies on collaboration and including staff knowledge and expertise; Council has the issue top of mind and allocates resources, staff must buy in and be motivated to implement council’s plan (Focus group 4: September 24 2014).

These findings provide evidence that there are important, mutually reinforcing roles for both political support and staff expertise in facilitating the process of adaptation planning and implementation.

4.6.7 Stakeholder and public engagement: How are they engaged in the adaptation policy making and planning process?

The MCCAP guidebook specified that municipalities were not required to conduct formal public consultation, however the involvement and inclusion of key stakeholders was encouraged in the development of the MCCAP committee and the

preparation of the MCCAP plan. Expert stakeholders included a broad representation from different levels of government as well from within the municipalities.

Based on 20 responses, 13 of focus group participants identified that stakeholder consultation was utilized in the preparation of the MCCAP, while 7 participants identified that public participation did occur in the preparation of the MCCAP and 7 participants identified that public participation did not occur in the preparation of the MCCAP.

Several focus group participants noted that attempts at public consultation were met with a low level of public participation, citing further concerns over the veracity of publicly provided information as well as a fear of alarming the public, among the issues associated with public consultation on climate change risks and adaptation. However, several participants also mentioned that open public meetings, public representation on the MCCAP committee and active solicitation of public input on the MCCAP through surveys, public presentations, focus groups, as well as through community promotions and websites, as examples of public engagement in the MCCAP. Expert stakeholder representation on the MCCAP committee as well as stakeholder meetings and consultations, both internally within the municipality as well as externally with the provincial government and other relevant expert stakeholders, were also mentioned.

These findings suggest that a diversity of stakeholder engagement approaches were utilized to prepare the MCCAP and there was further variability in the level of public engagement across municipalities, presenting opportunities for further analysis.

4.7 Summary

The format of the focus groups included the ranking of all discussion questions for further synthesis discussion, with the top ranked questions forming the basis for discussion as a large group. With respect to policy integration, all four focus groups identified the discussion question related to the barriers and opportunities for bridging the ‘implementation gap’ between MCCAP preparation and implementation as the most important topic for further discussion. This key finding points to the high level of interest

common across focus groups in the next steps for MCCAP and moving from planning to implementation.

4.7.1 Policy integration: In what ways were the adaptation planning and policy objectives integrated into other municipal activities?

Based on 22 responses, 12 participants cited capacity constraints as the top barrier to bridging the gap between MCCAP preparation and implementation. Capacity constraints hindering implementation included a lack of time, resources and/or expertise required for implementing long-term adaptation as well as emergency measures plans. An equal 12 participants cited lack of dedicated, designated and/or matched funding from other levels of government as hindering MCCAP implementation. They also cited competing infrastructure priorities in an environment of scarce financial resources as problematic to advancing adaptation implementation. Constraining factors cited by seven participants were council engagement, political ‘buy-in’, ‘will’ and/or leadership/motivation and the corollary lack of public knowledge, desire and expectations to advocate for political leadership on MCCAP priorities.

Nearly a third of focus group participants cited the provision and acquisition of climate change related data (e.g., LiDAR mapping, energy usage data) required for enabling MCCAP implementation as a key means to enable MCCAP implementation. Five participants recognized integrated regional approaches for advancing long-term adaptation and emergency planning through regional emergency measures organizations and developing and supporting ‘regional champions’ for climate change adaptation as key opportunities for enabling municipal adaptation. As well, four participants identified the integration of climate change considerations into municipal planning processes (work plans, capital plans and projects) as a key opportunity for MCCAP implementation.

Significant implementation barriers identified by participants included: ‘institutionalized inertia’ such as unequal institutional divisions of authority, governance inequities in taxation revenue generation and service delivery, as well as changes in government, among the problematic factors contributing to poor inter-governmental collaboration on climate change adaptation. Participants further highlighted constraints including a lack of

education, awareness, feedback or public participation as well as a lack of regional collaboration and overlapping jurisdictions. A lack of land-use controls in rural areas was also seen as a barrier to effectively managing climate change risks.

Significant opportunities identified by participants for enabling MCCAP implementation included the immediate and long-term potential for inter-governmental collaboration on issues of climate change adaptation, including clarifications of legal responsibility, in order to facilitate planning and implementation of adaptation and emergency preparedness plans. Participants also highlighted the importance of maximizing opportunities for operationalizing the experience, skills, staffing and resources required for implementation of MCCAP priorities. Further stakeholder collaboration (e.g., academia) and opportunities for education and outreach were also mentioned.

With respect to academic collaboration, participants identified three main categories of interest to future opportunities for academia to provide capacity support for municipal adaptation. These categories included: 1. Providing service-based information to support municipal adaptation needs; 2. Assisting with action planning by helping to fill analysis gaps to support risk prioritization and evidence-based decision making; and, 3. Assisting with capacity-building through community engagement, education and/or training for municipal councils and the public to support adaptation implementation.

Based on 19 responses, participants identified research needs for ‘best practices’, frameworks, case studies, including tools and processes, for adaptation. Action planning for flood management, coastal research on open space planning, as well as assisting with further needs for technical information including modeling, scenarios and mapping to local scales were all identified as gaps that could be addressed through academic collaboration. Developing methods for monitoring climate change impacts also was identified as a knowledge gap.

Participants also offered an array of suggested solutions for monitoring the integration and enforcement of MCCAPs. Gauging the effectiveness and implementation progress of MCCAPs through capital investment planning and staff reporting on MCCAP priorities through MCCAP ‘report cards’ or annual review processes were suggested as

mechanisms to monitor MCCAP implementation. Identifying, initiating, supporting and/or communicating opportunities for multi-level governance co-operation and leadership on climate change adaptation were also suggested as roles for monitoring and evaluating adaptation policy progress at broader scales. Further providing research synthesis of the MCCAP case study was seen as a means of supporting and developing provincial adaptation priorities, strategies and policy instruments (best practices through research and information). Participants reported that academia could also play the role of monitoring adaptation progress through data collection and feedback for municipal adaptation decision making and prioritization (e.g., coastal erosion and climate change impacts).

Participants suggested the production of simplified, practical and usable applications as a possible mechanism to facilitate academic collaboration and municipal decision support. This included suggestions for collaborative research projects such as a searchable portal for academia and municipalities to post proposals and make requests for research. Municipalities also recognized academic collaboration as a viable, cost-effective alternative to hiring consultants to conduct risk analysis.

4.8 Conclusion

As these findings have illustrated, the MCCAP adaptation policy process and the content of MCCAP adaptation policies and plans in Nova Scotia provides a compelling research subject and an opportunity for developing mixed methods and applied research approaches that can contribute to the advancement of adaptation theory, policy and practice across scales and jurisdictions. Conducting comparative case-based research and analysis into the processes of adaptation policy making and the content of adaptation policies and plans in case-based empirical settings requires the further development of research methods and conceptually analytic frameworks that can focus attention on the pertinent social characteristics that enable adaptation policy making. In the case of Nova Scotia's MCCAP, a critical aspect of enabling local adaptive capacity and adaptation policy making was the utilization of a financial policy instrument adopted by higher levels of government to influence and incentivize adaptation policy development and policy making at the local scale. Nova Scotia's MCCAP provides an important example

of an effective policy framework for incentivizing and initiating local planning processes to addresses issues of climate change risk by monetizing adaptation planning.

The MCCAP policy mandate specifically aimed to achieve the production of 53 municipal plans that recognize contextual hazards and risk issues associated with climate change impacts at the local scale in Nova Scotia's municipalities. The mandate-targeted municipalities who were delegated the responsibility of facilitating the MCCAP process through committees tasked with identifying municipal climate change risks and prioritizing adaptation issues and options for action. The Department of Municipal Affairs (DMA) and the Nova Scotia Infrastructure Secretariat presided over the monetization of adaptation planning gas tax reporting requirement for municipalities, while the DMA, academia, NGOs and consultants further enabled municipalities by providing the consultative capacity-building required for completing the MCCAPs.

The monetization of adaptation planning was linked to a mandatory reporting requirement for the transfer of financial resources from higher level of government to fund local infrastructure and development services and needs. Provincial policy making leadership emerged based on historical experiences with climate change focus events (e.g., Hurricane Juan) and a layered history of adaptation planning and entrepreneurial policy making (2003-2010) that contributed to the effective implementation of the MCCAP mandate in 2011. The mandate allowed municipalities three years to prepare the MCCAP, while also providing capacity-building and collaborative supports to municipalities to guide and assist with risk identification, prioritization and plan preparation. Strategic vulnerability assessment and climate risk policy development was framed as a process for developing efficiencies in municipal investments to guard against future costs associated with climate impacts, as a matter of risk management and good governance.

Academic collaboration was reported to have occurred in over half of focus group stakeholders' municipalities', indicating a strong role for academia to frame the adaptation problem and support local stakeholders' decision making processes through the provision of non-biased, externally credible policy making advice. Stakeholder

engagement and consultation on local adaptation issues of climate change risk included public participation in a third of municipal focus group participants' municipalities. However, stakeholders raised concerns with regards to pre-emptively alarming the public without adequate information on climate change, as well as concerns regarding the poor quality of climate risk information associated with public consultation processes.

The majority of Nova Scotia municipalities ranked marine climate change hazards and climate change impacts such as hurricanes, high winds, storm surge and longer-term sea level rise as high risk priorities in their MCCAPs (Reeves, 2014). Municipalities utilized HRVA, LiDAR mapping, asset mapping, flood-risk mapping, council input, committee work and discussions in order to identify critical infrastructure and public safety concerns raised through the development of a greater awareness and knowledge of potential and actual climate change risks and hazards presented at the local scale in Nova Scotia's municipalities.

Areas identified for further developing adaptation policy options for municipal stakeholders include: municipal licensing and regulation options; municipal facilitation, advocacy, leadership and public education on climate change risks; adapting municipal service delivery and community development and encouraging greater civic engagement on issues of local climate change responses. Collaboration with emergency management organizations, regional municipalities and the provincial government on issues of policy jurisdiction and coastal risk were identified as opportunities for facilitating knowledge transfer. Collaborative processes to enable better access and transfer of climate change related information and data was perceived to be required in order to encourage integrated approaches to land-use and emergency preparedness planning, water resource management, community-based monitoring of climate change impacts, including integrating flood elevation policy and planning into municipal land-use strategies and emergency preparedness plans. There were important, mutually reinforcing roles for both political support and staff expertise that were identified as important for facilitating processes of adaptation planning integration and implementation at municipal and broader governance scales.

Municipal capacity constraints such as a lack of time, resources and/or expertise were discussed as hindrances preventing the long-term integration of adaptation into planning and policy making processes at the local scale. Lack of funding, fiscal austerity and low levels of political support for adaptation integration at the municipal scale were further identified as hindrances to local adaptive capacity building in Nova Scotia's municipalities. Facilitating better access to data and encouraging regional planning approaches in order to integrate adaptation into municipal operations provides substantial opportunities for entrepreneurial adaptation policy integration and development. However, structural, institutional and political barriers in Canada's multi-level governance system hinder the capacities for adaptation integration at the local scale. Clarifying policy jurisdictions, roles, responsibilities and possible policy making actions to respond to local issues of climate change risk requires broad engagement with governance stakeholders and academia to enable adaptation best practices, frameworks, tools, processes and monitoring techniques for adaptation policy areas such as coastal flood management and integrated land-use and emergency planning,

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Chapter Five

5 ‘Roaming the eastern frontiers’ of multi-level climate change governance research: An exploratory, descriptive case study analysis of the impactful social factors that initiated and built capacity for municipal adaptation policy and planning in Nova Scotia, Canada

5.1 Introduction

Intentional, substantial and concrete climate change adaptation policy-making case studies like Nova Scotia’s MCCAP offer critical opportunities to: i) clarify conceptual adaptation research approaches; and, ii) advance adaptation case study research methods. Taken together, this case study targets building conceptual and empirical knowledge of provincial and municipal (multi-level governance) climate change adaptation planning and policies efforts (Baynham and Stevens, 2014; Dupuis and Biesbroek, 2013; Murtinho and Hayes, 2012; Horak, 2012; SNSMR, 2011).

Chapters Five and Six utilize the conceptual framework (outlined in Chapter Two and Chapter Three) to conduct an exploratory, descriptive ‘across individual case’ analysis of Nova Scotia’s MCCAP policy-making process at the municipal scale. Using a within, ‘across individual case’ research approach, qualitative data analysis explores the impactful social factors in the MCCAP multi-level adaptation governance framework, as comparatively illustrated across three purposively selected municipalities (Amherst, Shelburne, Bridgewater; See Figure Five). This approach operationalizes a primary research objective of this study: to provide illustrative description of the impactful social factors across internal individual cases of municipalities tasked to prepare an adaptation plan within the larger multi-level adaptation governance case of the MCCAP process in Nova Scotia. This Chapter builds on the results of the focus groups by using an online survey to prioritize impactful social factors. These factors are then thematically cross-examined in three individual cases to explore and describe similarities, differences and contrasts internally and externally in relation to conceptual literature.

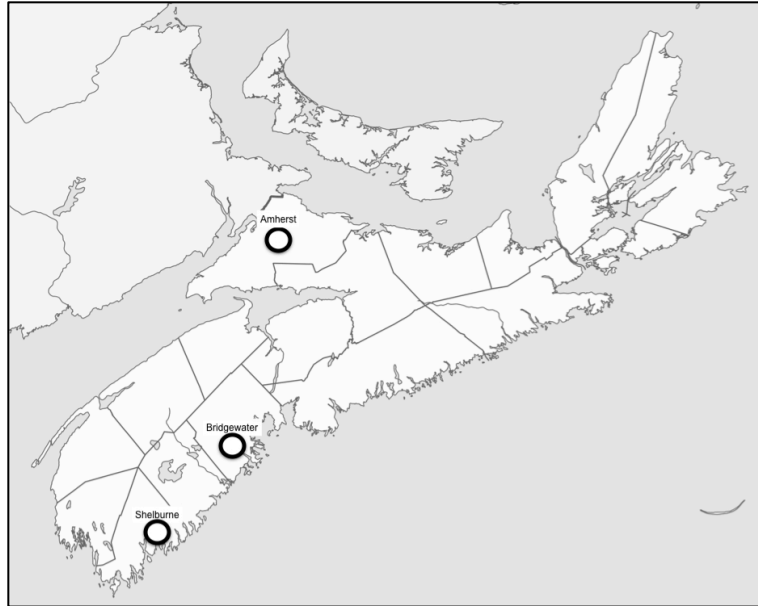


Figure 5: Three purposively selected municipalities for exploratory, descriptive 'across individual case' analysis of social factors impacting municipal planning and policy making in multi-level governance contexts: Amherst, Bridgewater and Shelburne, Nova Scotia, Canada

To accomplish this objective, Chapters Five and Six uses findings representing aggregated municipal adaptation stakeholders' opinion trends about the social factors impacting MCCAP development as a rubric for scoping illustrative depth-investigation across the 'individual case' level of three municipalities. Illustrating how social factors can impact municipalities across individual cases, provides further contextual depth and insight into the online survey findings. This chapter seeks to determine what social factors impact, enable and constrain climate change adaptation planning processes being initiated, developed and capacitated in the multi-level governance case of Nova Scotian municipalities tasked with the MCCAP mandate.

5.2 Within MCCAP case study: 'across individual case' strategy and conceptual propositions

This section of the chapter will describe the mixed qualitative research methodology developed and employed in this within, 'across individual case' study analysis as a necessary preface to presenting the analytic results and discussing study findings.

To facilitate analysis of municipal MCCAP planning and policy-making processes, two conceptual propositions were developed related to adaptation initiation and capacity building. These propositions were explored using two case study methods. First, a breadth approach used an online survey to iteratively re-test and refine focus group results. This provided a useful method for determining representative opinion trends at the aggregate level of Nova Scotia municipalities tasked with MCCAP completion, based on the targeted demographic of municipal adaptation stakeholders. Based on analysis of the online survey results, prioritized opinion trends about impactful social factors were identified using a descriptive quantitative indicator. This method narrowed the scope of research interest for conducting across individual case study analysis of interview findings to provide illustrative depth and contextual insight about impactful social factors at the municipal case level. This within MCCAP case, ‘individual municipalities’ case’ approach provides comparative depth and contextual insights about the survey findings.

The survey provided a 36% representative sample of all Nova Scotia municipalities. Prioritized opinion trends about impactful social factors used 3/4, or +75%, participant agreement in the online survey results as the screening mechanism for narrowing the scope of in-depth inquiry in the across individual case study analysis of three purposively selected municipalities. Conceptual propositions and functional policy themes provide a dynamic reporting platform and narrative format for contrasting MCCAP planning and policy process to determine similarities, differences and contrasts across individual cases. Across individual case analysis of interviews conducted with staff and council in three purposively selective municipalities, are further complimented with interviews conducted with non-municipal adaptation stakeholders. All interviewees were involved with the MCCAP multi-level adaptation governance framework and provide a representative cross-section of municipal adaptation stakeholders. This multi-stakeholder research approach provides a variety of perspectives and voices in the across case study analysis of social factors impacting municipal scale adaptation policy and planning, in the broader context of the MCCAP multi-level adaptation governance framework in Nova Scotia, Canada.

The strategy for across individual case study analysis combines exploration of two conceptual propositions and the use of categorical policy sub-themes to illustrate prioritized opinion trends identified using an iterative online survey that retested previously gathered focus group data. Interview analysis provides depth illustration of the iterative survey results and creates opportunities for discussing MCCAP empirical findings in relation to conceptual knowledge.

5.2.1 Conceptual propositions

5.2.1.1 Municipal adaptation planning initiation in multi-level governance contexts

Across individual cases, this Chapter further explores and describes the similarities and differences about how the MCCAP / gas tax linkage was a key impacting social factor in the multi-level adaptation governance case of Nova Scotia. The first conceptual proposition of interest in this case study pertains to the *agenda-setting and problem-framing* in multi-level adaptation governance frameworks. It is proposed that differential policy power and control over jurisdictional resource distribution provides critical governance pre-conditions for the initiation of municipal adaptation planning and policy-making in multi-level governance contexts. A common quasi-independent variable (e.g., a concrete policy mandate from a higher level of government incentivizing adaptation policy-making and planning for a lower level) is exhibited in the case of the Nova Scotia MCCAP multi-level adaptation governance framework. The case provides a unique and ideal case study environment to further develop illustrative, exploratory, descriptive adaptation case study research methods. Within case study of Nova Scotia's MCCAP across municipal individual cases provides an opportunity to explore and describe how agenda setting and problem-framing in multi-level adaptation governance contexts occurs. Using three individual cases to illustrate the depth and context of impactful social factors determined using the iterative survey enables planning comparisons at the local scale, in broader contexts of multi-level adaptation governance. The cross-comparability of the individual cases benefits from the homogenous independent variability established by the MCCAP policy mandate.

The plausible catalyst for municipal adaptation policy initiation in this case study is the provincial MCCAP gas tax policy mandate. The MCCAP mandated monetized municipal adaptation planning by using the gas tax financial incentive to require all Nova Scotian municipalities to comply with the MCCAP reporting requirement. Non-compliance meant running the risk losing a valuable municipal revenue stream for infrastructure maintenance and development. Focus group results indicated that the monetized adaptation planning policy mandate provided a powerful multi-level governance policy mechanism for agenda setting and problem framing. The power of the MCCAP multi-level adaptation governance framework as a critical pre-condition for the initiation of adaptation policies and plans in Nova Scotia municipalities is further explored and described in this chapter by illustratively contrasting three individual cases of MCCAP planning processes.

5.2.1.2 Municipal adaptation capacity building in multi-level governance contexts

The second conceptual proposition relates to how capacity-building resources distributed through multi-level adaptation governance frameworks can serve as impactful social factors for enabling municipalities' tasked with adaptation policy and planning. This conceptual area of interest uses the functional policy themes of *stakeholder engagement, public participation, policy formulation and risk prioritization* processes to explore and describe how multi-level governance and other social factors impact municipal adaptation capacity building in municipal cases. Documenting, exploring and describing contextual variations in municipal MCCAP policy making processes uses evidence from across cases to illustrate how social factors can impact municipal adaptation capacity building in the broader context of the MCCAP multi-level adaptation governance framework of Nova Scotia.

5.3 Mixed methods

5.3.1 Breadth approach: Online surveying

An online survey was used to re-test focus group results and generate iteratively produced, quantifiable data about the social factors impacting municipal adaptation

policy and planning in the MCCAP multi-level adaptation governance context. Survey results broadly identified representative municipal opinion trends of interest from more than a one-third representative sample of municipalities (36% of Nova Scotia municipalities) tasked with completing the MCCAP. Survey responses achieved targeted demographic sample saturation (70% of survey participants were land use planners). Survey results were categorized and organized according to conceptual themes and functional policy sub-themes. This format provides a reporting guide for categorical, across individual case analysis to provide depth illustration and context about impactful social factors affecting municipal adaptation planning in multi-level adaptation governance contexts (See Appendices G3 and G4).

Survey results indicated that stakeholder opinions expressed in the survey largely represent a staff perspective, and in particular, the perspective of municipal land-use planners and development officers tasked with preparing MCCAPs (the targeted sample for this survey). Municipal planners were also previously identified as the top staff demographic involved in MCCAP committee structures in previously conducted content analysis (See Figure Three). Planners were also the top demographic participating in focus groups, thus source-triangulating planning stakeholders perspectives about the social factors impacting municipal adaptation policy and planning development and implementation in this study.

The online survey results narrowed the scope for across individual case analysis to illustrate how impactful social factors affected the MCCAP process across municipalities. The online survey provided an iterative method for re-assessing focus group participants' perspectives about impactful social factors affecting the MCCAP process. The survey produced prioritized results narrowing the scope of analysis of three municipalities MCCAP planning and policy-making processes. Non-municipal adaptation stakeholder interviews were similarly explored. Online survey prioritized results about the impactful social factors of interest for conducting scoped, illustrative depth analysis across individual cases of MCCAPs in order to illustrate depth and context by comparing individual cases of adaptation planning processes to identify patterns, similarities and differences (See Appendices G3 and G4).

The online survey provided a useful method for prioritizing social factors impacting affecting municipal adaptation planning and policy-making in the case of the MCCAP multi-level adaptation governance context, while narrowing the scope for individual case analysis. The findings produced in this exploratory study are acknowledged to lack reliability in the definitive attribution of social causality. However, exploratory, descriptive, illustrative case studies about multi-level adaptation governance provides opportunities for documenting new phenomena, while producing formative, equivocal findings that can be informative to grounded theory development about multi-level adaptation policy development (Gupta, 2012; Yin, 2003; Rutman, 1984; Froman, 1968). Secondly, the preliminary identification of impactful social factors active in multi-level adaptation governance policy frameworks offers research insights about policy making themes and social patterns worthy of future research attention in multi-level adaptation case studies and policy assessments of multi-level adaptation governance frameworks (IPCC, 2014; Corfee Morlot et al., 2009).

5.3.2 Depth approach: Across individual cases of three purposively selected municipalities

Individual case study analysis at the municipal scale of MCCAP planning processes was based on primary research that included six semi-structured interviews with municipal staff and council conducted in three purposively selected, similarly sized and ‘at risk’ Nova Scotian municipalities, for conducting across case research. These municipal cases were purposively selected based on shared similarities in size, economic similarities in regional service-center status’ and shared vulnerability and sensitivity to long-term impacts associated with sea-level rise and related coastal climate impacts (MCCAPs, 2014; Statistics Canada, 2012; Natural Resources Canada, 2004). Commonalities among all case study areas included similarities in serving as the service-based ‘hubs’ in the larger regional economy, as well as similar reliance on seasonal tourism activities as an important local economic contributor. All three municipalities also shared concerns related to coastal and inland flooding as climate change impacts of top priority in their MCCAP documents (see Table Three and Appendix F3).

	Shelburne	Bridgewater	Amherst
Population	1686 (-10.3% 2006-2011)	8241 (+3.7% 2006-2011)	9,717 (+2.2% 2006-2011)
Size	9 km ²	13.6 km ²	12 km ²
Top Climate Adaptation Concerns	Coastal flooding, inland flooding, drought	Extreme weather, flooding, lack of capacity for emergency planning; vulnerable infrastructure and populations; social and economic vulnerabilities	Marshland flooding and inland flooding

Table 3: Case study profiles (MCCAP Plans, 2014; Statistics Canada, 2012)

Shelburne and Bridgewater are located on the Atlantic Coast of Nova Scotia, while Amherst is located in proximity to the Bay of Fundy and the Northumberland Coast of the Gulf of St. Lawrence, in an area of coastal marshes historically subjected to risks of overland flooding impacting transportation and wastewater infrastructure. Shelburne has a deep-water harbour, a historic waterfront and municipal infrastructure exposed to North Atlantic hurricanes and storms, while Bridgewater is located on two sides of a coastal river subject to ice jams risks to bridges and risks of urban flooding, as climate impacts of top concern.

To protect interviewees' anonymity, municipalities' locational attributes have been altered from place names to letters. Six municipal adaptation stakeholders from these three municipalities were anonymously interviewed. Participants included: a land-use planner (Municipality A), a sustainability planner and a councilor (Municipality B), an emergency response coordinator (Municipality B/C), a chief administrative officer (CAO – Municipality C) and a mayor (Municipality C). Five of these six municipal interviewees also participated in the concurrent focus groups conducted in 2014 indicating the potential for respondent biases based on focus group participation. This issue was addressed as best as possible via the utilization of a standard interview guide and adherence to interview protocol (Appendix F2). One study limitation to across case

comparability was the absence of a political interviewee in Municipality A, making contrasts between Municipality B and C more robust.

Four non-municipal stakeholder interviews were also conducted with a provincial policy-maker from the implementing department; two consultants involved with MCCAP planning processes and one representative from a municipal non-governmental organization. These non-municipal interviewees add external perspectives and broader contextual insights to compliment analysis of the social factors impacting municipal adaptation policy and planning. One of these four non-municipal interviewees also participated in the focus groups, representing a potential issue of respondent bias.

All interviewees were purposively selected for research participation based on their direct involvement in the provincial MCCAP policy-making process and/or their involvement with municipal adaptation planning processes, specifically in the individual case municipalities. Purposively selected stakeholders and municipalities were sent recruitment letters of information and pre-consented interviews were conducted confidentially, in-person, in Nova Scotia in 2014 using an interview guide (See Appendix F2). All interviews were audio recorded for transcription. Subsequently, audio and text data were indexed and collated categorically in order to facilitate across individual case study analysis of interview results. The prioritized opinion trends related to impactful social factors identified via online survey results narrowed the scope for illustrative across individual case analysis of interview findings. Case evidence is described using the functional policy themes to organize evidence and assess and discuss results in relationship to the conceptual literature.

The mixed qualitative methodology developed and utilized in this municipal adaptation governance case study analysis arguably provides an empirically grounded research approach for exploring and describing how impactful social factors influence municipal adaptation planning in broader multi-level adaptation governance contexts.

The rest of this chapter operationalizes this experimental case study approach for descriptive, exploratory presentation and cross-comparison of semi-structure interviews results using a conceptual framework and functional policy sub-themes. The ‘intentional,

substantial and concrete' MCCAP policy landscape overcomes the dependent variable problem (Dupuis and Biesbroek, 2013) opening a window for advancing comparative adaptation research using within case study of the MCCAP to illustrate individual cases of adaptation planning with the aim of determining similarities, differences and contrasting social patterns.

The analytic rubric for across individual case study in this chapter includes exploration and illustrative description of: i) municipal initiation of climate change adaptation planning - agenda-setting and problem-framing; and ii) building of municipal adaptive capacity - formulation of adaptation options and risk prioritization processes (see Table Four). Using the functional policy questions, the Chapter explores how impactful social factors manifest, across three cases of municipal MCCAP planning processes. This offers a qualitative method for advancing illustrative depth insight through descriptive contrasting evidence based on the perspectives of municipal stakeholders. Non-municipal stakeholders also give external and comparative voice to the broader individual case context of the MCCAP multi-level adaptation governance framework. This provides an operable research approach for conducting across individual case empirical data analysis to compare and discuss findings in relation to the policy themes and external conceptual literature.

Rubric for the across individual case study analysis of municipal adaptation policy and planning processes in the context of MCCAP multi-level adaptation governance	
1.0 Policy Initiation <i>Conceptual Proposition:</i> Adaptation policy initiation through multi-level governance can act as a critical pre-condition for the initiation of adaptation policies and plans in municipalities.	2.0 Capacity Building <i>Conceptual Proposition:</i> The provision of capacity-building resources through multi-level governance can serve as a key factor for enabling municipalities' tasked with adaptation policy and planning.
1.1 Adaptation agenda-setting Question: How did adaptation policy/planning arise on the agenda?	2.1 Formulating adaptation options Question: How were adaptation planning and policy options formulated?
1.2 Adaptation problem framing Question: How is the adaptation policy/planning problem framed?	2.2 Risk prioritization processes Question: Is there an explanation of the way in which priorities are set? How does it vary across cases?

Table 4: Across individual case analytic rubric: adaptation policy initiation and adaptation capacity-building

5.4 Adaptation policy initiation: How is the municipal adaptation agenda set? How is municipal climate change adaptation framed?

Online surveying determined municipal stakeholders opinion trends with respect to the combination of social factors setting the municipal agenda for the MCCAP process. The largest number of survey participants' affirmed that the gas tax incentive and past experience with focusing events (e.g. storms, damages) were the top factors setting the agenda and framing the problem for the MCCAP process in Nova Scotia. These results affirm previous focus group and content analysis findings related to the powerful role of the gas tax played as an impactful social factor of initiating municipal adaptation planning in Nova Scotia, Canada. Please see Table Five for survey results below. Based on these survey results, the agenda-setting and problem framing roles of the gas tax incentive and historical focusing events were deemed to be the most impactful social factors for illustrative description in the across individual case analysis of three municipalities' MCCAP policy and planning processes. This section explores and describes how the gas tax and focusing events impacted MCCAP planning processes, within the broader multi-level adaptation governance framework of Nova Scotia.

5.4.1 Gas tax incentive: municipal analysis

All municipal interviewees unanimously confirmed the importance of the gas tax funding as a primary motivating factor. This finding triangulates and confirms the importance of the MCCAP reporting requirement's linkage to the gas tax as the 'instrumental, strong impetus, push or incentive' to set an agenda for completing the municipal adaptation plans (See Table Six). Despite the potential for a negative political reception at the local level, according to the land use planner (Municipality A) and the sustainability planner (Municipality B) who were interviewed, the MCCAP mandate was generally not perceived to be politically coercive, rather it was viewed pragmatically given municipal decision-makers' pre-existing familiarity with the gas tax funding apparatus and previous, obligatory gas tax reporting requirements such as the ICSP.

The specific and bounded scope of inquiry of this case study (e.g., 2011-2014: Nova Scotia MCCAP / gas tax policy mandate) seeks to provide further details and elaboration about social factors impacting municipal adaptation agenda setting and policy making within this multilevel adaptation governance framework. However it is noted that previous hierarchical, mandatory reporting requirements and municipal sustainability planning initiatives (e.g., 2005-2010: Integrated Community Sustainability Plans / gas tax policy mandate) preceded the initiation of municipal adaptation planning in Nova Scotia.

In very pragmatic terms, the MCCAP built on the familiar gas tax reporting framework while being understood by local stakeholders as a beneficial opportunity to partake in a pragmatic risk management planning exercise to better understand, adapt to and mitigate against local scale climate change risks, hazards and impacts on municipalities.

Adaptation policy and planning initiation: online survey results (+75% agreement)	
<p style="text-align: center;">Agenda Setting</p> <p>19/22 reported the gas tax was the most influential initiating factor for MCCAP</p> <p>21/22 agreed with an assessment of the social factors and ‘enabling conditions’ MCCAP narrative that included: The gas tax provided an economic incentive for adaptation planning; Experience with historical damages from storms; Regional collaboration on emergency preparedness planning; Building on existing ICSP sustainability planning initiatives; Provincial, academic and non-governmental planning and policy-making capacity-building and support</p>	<p style="text-align: center;">Problem Framing</p> <p>18/22 reported historical focus events were somewhat/very important for initiating and/or framing MCCAP</p> <p>19/22 reported the gas tax was a somewhat/very important for initiating and/or framing MCCAP</p>

Table 5: Online survey results - MCCAP adaptation policy and planning initiation – 36% representative sample of Nova Scotia municipalities’ land use planners opinion trends

Land-use planner (Municipality A)	The gas tax was instrumental.
Councilor (Municipality B)	Who is going to pass up that opportunity? And how do you explain that to your constituency? If you said, no, we decided not to focus on climate and give up the money that comes along with it. That’s definitely a big incentive. I think it played a very important role. It’s a strong incentive.
Sustainability planner (Municipality B)	...which affected the development process the most...? I would say that without a doubt that is the gas tax.
CAO (Municipality C)	The impetus to do it really did come from being forced to do it.
Emergency measures coordinator (Municipalities’ B/C)	It [MCCAPs] wouldn’t have happened without it [gas tax].
Mayor (Municipality C)	Would it have happened without the gas tax? I would have to say I would hope it would have. But highly unlikely and I mean basically it may not have... it was the push... you will do it or you don’t get the money.

Table 6: Municipal stakeholder comments regarding the agenda setting policy power of the monetary incentive for adaptation planning reporting as a part of the Gas Tax/MCCAP policy mandate: Nova Scotia, Canada.

5.4.2 Gas tax incentive: non-municipal analysis

The provincial policy-maker who was interviewed from the implementing department stated that the direction to prepare an MCCAP came from a 2011 provincial policy mandate that required all Nova Scotian municipalities to prepare a MCCAP by January 1, 2014 in order to continue to receive gas tax transfer funding. The interviewee elaborated that MCCAP reporting requirement and financial incentive acted in concert to incent municipalities to form MCCAP committees and work through a stepped MCCAP guidebook provided by the province. According to the interviewee:

We were looking for consistency across these plans and to provide the framework, that kind of series of steps with the instructions, that's very important, because we were looking for a certain level of quality, of information in these plans. I think by setting that direction, by setting the agenda, by defining a problem as much as possible that really helped... We were interested in MCCAP because we knew that we wanted plans that were all done to a similar standard... Having the problem defined, and agendas set, and methodology, and some steps, just made it easier for municipalities (Provincial policy-maker: September 12 2014).

The NGO interviewee also noted that the innovative MCCAP policy built on pre-existing ICSP / gas tax policy framework to provide a monetary incentive to municipalities to prepare climate change action plans in Nova Scotia, with an emphasis on adaptation planning. The interviewee noted how congruent provincial policies were contributive to development coherent and socially accepted multi-level governance climate change agendas (e.g., Municipal Memorandum of Understanding on Climate Change, 2009; Provincial Climate Change Action and Renewable Energy Plan, 2008). When questioned whether or not climate change adaptation planning would have occurred without the gas tax incentive, the interviewee responded that due to low-levels of municipal capacity, beyond the exception of Halifax, the largest municipality, '...it probably wouldn't have got done' (NGO representative: September 12 2014).

The provincial policy-maker interviewed offered further insights into the background and emergence of the MCCAP policy framework, noting:

... The most important thing would have been policy levers such as the financial incentives and regulatory mandates... If we haven't had made this [MCCAP] as a reporting requirement of the second part of the gas tax agreement we probably would not have got every municipality in this province... We were the only province in Canada to take that second phase of the gas tax and to do that... You know the gas tax was the classic carrot and stick approach. It worked very well

because there was an incentive, and it was also tied to a flow of funding. It had the desired effect certainly (Provincial policy-maker: September 12 2014).

When questioned whether or not climate change adaptation planning would have occurred without the gas tax incentive, the provincial policy-maker commented, 'I think we would have done it... it would have been a more difficult process. It would have taken a lot longer. There would've been a lot more convincing, probably a little more reluctance' (Provincial policy-maker: September 12 2014).

All four non-municipal interviewees discussed how policy levers (financial incentives and/or regulatory mandates from higher levels of government) influenced and initiated the municipal adaptation policy-making process. Interviewees discussed how the gas tax incentive and MCCAP reporting requirement played an instigating municipal climate change adaptation policy development and planning efforts in Nova Scotia municipalities. The MCCAP policy process was discussed by participants as building on pre-existing concerns identified in the ICSP process, and, through the MCCAP mandate, staff and councils of Nova Scotia municipalities were provided an incentive that set the agenda and framed the problem for conducting a municipally nuanced assessment and analysis of local scale vulnerabilities to climate change impacts. MCCAP created an opportunity for addressing risk management issues due to climate change impacts already occurring, or projected to occur, in the 53 municipalities of the province of Nova Scotia using a multi-level adaptation governance framework that monetized adaptation planning.

5.4.3 Focusing events: municipal and non-municipal analysis

18 out of 20 survey respondents identified that historical focusing events (e.g., storms, damages) were somewhat or very important for initiating or framing the MCCAP adaptation planning process. Seven of ten interviewees discussed how historical experiences with climate change hazards and impacts had affected municipal planning and governance agendas prior to the mandated MCCAP. These complimentary findings offer an opportunity for illustrative across individual case analysis about the role that historical focusing events played as a social impact factor on municipal adaptation planning and policy making, in the broader multi-level adaptation governance case of the MCCAP.

5.4.3.1 Hurricane Arthur: 2014

Post-tropical storm Arthur (the first named Atlantic hurricane of 2014) caused extensive damages throughout the province of Nova Scotia and the Maritimes as it tracked up the Bay of Fundy on July 5, 2014. Winds in excess of 100 km/hour caused extensive power outages in the Maritimes due in part to falling branches and trees.

At the municipal scale, the councilor from Municipality B and the chief administrative officer (CAO) from the Municipality C both similarly discussed how Arthur was a focusing event that underscored the importance of the MCCAP planning process in each of their municipalities'. These similar contextual insights indicate that focusing events (e.g., coastal flooding, extreme weather) had framed the planning problem by contributing a complimentary social impact factor that underscored the importance of the MCCAP adaptation planning agenda and reporting requirement.

In Municipality B, the councilor commented that although Arthur occurred after the MCCAP was complete, this 'focusing event' had influenced emergency contingency and transportation planning, prompting council consideration of "what if" situations:

...in our conversations following that [Arthur] debrief among council... we've got some issues to sort out. We're looking at an MCCAP that's telling us, expect more of this, and expect it to be more extreme. You better get your ducks in a row. We better be prepared (Municipal councilor: September 23 2014).

Similarly, the CAO Municipality C commented that Arthur '...was a motivating factor... and our real experience with them [focusing events] and what were really the challenges with our infrastructure... I think we were really discussing real climate change events in our community' (CAO Municipality C: September 24 2014). In these similar examples, interviewees have affirmed that a recent experience with climate change 'focusing events', such as post-tropical storm Arthur, acted as a social impact factor in adaptation agenda-setting and problem-framing, underscoring and affirming the importance of the MCCAP multi-level adaptation governance framework.

In Municipality A, the land use planner discussed how the land use planning strategy did not explicitly incorporate hazards and impacts. However, the priorities identified in the MCCAP were based on historic flooding impacts from overland marsh flooding and

mapping projections for future climate impacts developed based on historical records. Prior to the MCCAP the land use planner discussed how inland flood impacts along a narrow brook had led to the creation of flood zone restrictions. In another pre-MCCAP example of adaptation responses to focus events, the land use planner discussed how an intense rainstorm had previously damaged culverts and waterlines, forcing municipal officials to use ad-hoc flood contingency measures to deal with storm water.

This evidence suggests that focusing events can be a social impact factor that contributes to stakeholders' buy in perceptions, legitimatizing multi-level adaptation governance interventions as a social acceptable policy agenda. Hazard problem frames associated with historical focusing events contributed the initiating social conditions for adaptation planning in Nova Scotia, based on historical experience with place-based vulnerabilities to climate change. Multi-level governance adaptation agenda setting and problem framing attention in the MCCAP framework, emphasized assessing contextual risk circumstances associated with historical focusing events as mechanism for consolidating municipal risk knowledge and initiating the development of adaptation priorities and actions.

The MCCAP offered municipalities an opportunity to consolidate previous climate change risk knowledge based on both recent and historical focusing events. According to the CAO interviewed in Municipality C, historical impacts associated with storm surge events had included: i) flooding of the municipality's downtown buildings and waterfront, affecting sewage collection and pump lift stations located close to sea level as salt water infiltrated; and, ii) inland flooding concerns due to impacts associated with storm water and surge and extreme weather and precipitation. The CAO commented that in Municipality C, prior to the MCCAP, infrastructure vulnerabilities were all previously identified as isolated infrastructure issues of concern. The CAO continued that the MCCAP provided a planning platform for contextualizing and unifying municipal knowledge of these infrastructure issues and their susceptibility to climate hazards. The interviewee expressed a desire to leverage the MCCAP risk assessment in order to further generate local political support for adaptation actions by pursuing multi-level governance support and funding for infrastructure adaptation. The mayor from Municipality C also

commented about waterfront vulnerabilities and the lack of current capacity to mitigate these risks.

The sustainability planner interviewed in Municipality B discussed how past experiences with hazards and contingency planning for extreme weather events had only occurred at a ‘fairly rudimentary level for different services in the town and that evolved over time’ (Municipal sustainability planner: September 23 2014). The interviewee noted that prior to the MCCAP, there were no organized records of climate change impacts or adaptation actions taken in many cases. However, as a result of completing the MCCAP, initial risk knowledge had been consolidated. The interviewee expressed that ample opportunities were available for further policy and operational changes to address integrated climate change risks and adaptation issues to municipal infrastructure; and the escalation of risk that climate change may present to the municipality in the future. The sustainability planner commented:

I think what we have never had is a comprehensive discussion on how do all of these services interface around these things...? Nobody had been considering the fact that these hazards may be exacerbated in the future... we know that sort of from a big picture perspective, we as a municipality have not been planning for these things, just in small pieces (Municipal sustainability planner: September 23 2014).

The notable across individual case difference of added sustainability planning staff capacity in Municipality B is a social impact factor worthy of further exploration and description. The councilor in Municipality B provided comments:

...The fact that we hired [the sustainability planner] fulltime suggest to me that the council of that day recognized what we could be facing in the future... [Also] we just reviewed and updated all of our planning documents. So, I think that the MCCAP process played a big role in that, because they were kind of happening at the same time. So, we could draw a lot from the MCCAP process in our planning review, to update and change some of our policies, where we felt it would be really important (Municipal councilor: September 23 2014).

The unusual social association that the councilor makes between past council decisions to hire the sustainability planner based on recognition that climate change and sustainability was a growing policy-making priority, is an interesting comment worthy of further investigation. In this quote, the interviewee perceives a past council action and decision to hire the sustainability planner as a proactive, adaptive planning response, suggesting that ‘the council of the day’ anticipated the future municipal need for sustainability

interventions. By autonomously increasing municipal adaptive capacity building (e.g., adding sustainability staff as a proactive measure) and further discussing how the MCCAP played a ‘big role’ in recent planning policy revisions, provides evidence about how the municipal adaptation agenda and climate change problem was framed for municipal policy makers (MCCAP integration into planning review). An indirect association is drawn between how reactions to historical experience with focusing events through autonomous adaptive capacity building (e.g., adding a sustainability planner) contributed to enabling Municipality B’s abilities to integrate municipal knowledge (e.g., MCCAP planning reviews) gained through the MCCAP process.

5.4.3.2 Hurricane Juan: 2003

All non-municipal interviewees discussed the socially important role of ‘focusing events’ and how occurrences and past experiences with climate change hazards and impacts had influenced how problems were framed and adaptation agendas were set at both provincial and municipal scales, including discussion of autonomous adaptive capacity building in rare cases.

Several interviewees discussed how provincial scale focusing events such as Hurricane Juan (2003) with significant damages and economic impacts was an impactful social factor for adaptation agenda setting and problem framing, widely influencing provincial and municipal scale adaptation policy-making social landscapes. Provincially implementing the MCCAP was reportedly to have related to the historical influence of Juan. This indicates, in the wake of Juan, that an adaptation policy window and subsequent policy entrepreneurship had played roles in the political legitimization of subsequent climate change risk mitigation measures, such as the MCCAP, among a wide audience of policy stakeholders in the Nova Scotia multi-level adaptation governance landscape (Kingdon, 2003; Birkland, 1998). This accreted social landscape created an underlying social context that provided fertile ground for the MCCAP multi-level adaptation governance framework to develop (Sayer, 1984).

The NGO interviewee discussed how after Juan, the Halifax Climate SMART program (2004-2007) and the Annapolis Royal flood risk mapping and planning case study (2006)

provided evidence of provincially significant, pre-MCCAP initiatives that initially raised awareness and municipal capacity for planning for climate change risks, contributive to the broader need for municipal adaptation planning and policy making agendas in Nova Scotia.

Consultant A contracted to complete several MCCAPs by Nova Scotia municipalities commented that Hurricane Juan was ‘a big deal’ that ‘certainly brought it to people’s attention’ (September 26, 2014). Consultant B also worked on MCCAPs and similarly commented that Juan ‘was fodder for those that wanted to implement the policy [MCCAP]’ (September 26, 2014). These comments illustrate the powerful effect of focusing events and post-disaster periods for opening transformative policy-windows for entrepreneurial multi-level adaptation policy development. Both consultants recognized storms and damage-related focusing events as socially impactful factors in provincial adaptation agenda-setting and problem framing.

The provincial policy-maker interviewed further corroborated that Hurricane Juan and other serious storms were contextually influential in provincial adaptation agenda-setting and adaptation problem framing for municipalities. He commented that past storms had:

...impacted municipalities directly, and caused damage and problems with private property. That confirmed to municipalities why they were being asked to undertake this [MCCAP]... So that really helped to create context to help bring it to ‘this is something real and this is something we need to plan for...’ (Provincial policy-maker: September 12 2014).

In the case of the MCCAP multi-level adaptation governance framework, the evidence suggests that place based risk contexts and historical experiences with climate change risks and hazards such as storms, surges and hurricanes served as pre-conditional social factors impacting and preceding the MCCAP policy development process.

The consultants interviewed elaborated on observational differences in staff capacity in relationship to acting on focusing events. The consultants offered that municipalities’ pre-MCCAP capacities to undertake actions in response to focusing events (e.g., Juan) related to social factors such as internal resources and capacities, including funding and staff availability; as well as the roles that are played by internal ‘change agents’ and stakeholders in shaping policy-making discourses. For example, Consultant A

commented that past climate change actions in the province's largest municipality, Halifax Regional Municipality (HRM), provided a positive municipal example of policy and planning responses to focusing events, prior to the MCCAP mandate. However, the interviewee also made note of the material differences in municipal staff capacity and financial resources in Halifax to address climate risk issues, prior to the gas tax mandate and in response to Hurricane Juan.

These findings indicate that municipal differences in adaptation policy and planning may relate to differences in municipal resources and staff capacity. Staff and resources are required to address the complex tasks associated with climate change planning. Focus events may induce institutional adaptive capacity building through increased staffing, in individual case contexts.

5.4.4 Initiation – adaptation agenda setting and problem framing discussion

The literature suggests that adaptation policy and planning has largely occurred as an inside initiated policy process, where technical expertise and internal policy making actors marshal efforts and operationalize responses to protect public interests, recognizing the longer-term need for adaptation (Dannevig et al., 2013; Corfee-Morlot et al., 2011; Penney and Wieditz, 2007; Lorenzoni and Pidgeon, 2006). Due to the long-term nature of climate change as a policy problem, and the generally low level of organized public interests demanding action on adaptation policy and planning issues like extreme weather and sea-level rise, the emergence of multi-level adaptation governance frameworks like Nova Scotia's MCCAP provides a valuable case example of adaptation agenda-setting and problem framing occurring as an inside-initiated policy development process (Cobb, 1976). In this case the provincial Department of Municipal Affairs presided over the development and implementation of the MCCAP policy mandate, with broader stakeholder support from municipal governments and non-governmental actors.

The evidence suggests that the MCCAP was partially framed as a response to climate change focusing events. Led by the provincial authorities, the MCCAP's development must be contextually understood in relationship to Nova Scotia specific focusing events

such as Hurricane Juan. After Juan, a layered social context for adaptation planning and policy-making had accumulated, increasing the social acceptability and stakeholders' receptivity for the MCCAP policy agenda, framed as an appropriate policy option for municipalities. MCCAP also benefitted and was perceived as socially acceptable, given municipalities' familiarity with the previous ICSP mandate and reporting requirement.

There are substantial barriers to setting agendas for local climate change adaptation policy development (Ford and King, 2013; Ekstrom and Moser, 2013) and autonomous emergence of climate change planning and policy at the local scale is not a well-understood social process (Bassett and Shandas, 2010). The literature suggests that climate change may be a poorly understood policy problem at the local scale and relying on autonomous municipal policy-making actions for adaptation can be difficult to reconcile with the shorter-term realities of scarce financial resources, lack of human resource capacity, lack of expertise and knowledge, and muted public demand for municipal adaptation as a priority for decision-makers at the local scale (Wagner and Zeckhauser, 2012; Lorenzoni and Pigeon, 2006; Reisinger et al., 2011; Simonsson et al., 2011; Measham et al., 2011).

As the across individual case analysis of adaptation policy initiation illustrates, the use of hierarchical policy power to set the agenda for municipal adaptation influentially included use of jurisdictional authority over gas tax resource distribution to incentivize mandatory adaptation planning and reporting. Historical and recent focusing events further confirmed to municipal stakeholders the importance of climate change adaptation planning, in light of visceral experiences with climate hazards and impacts in the coastal zone. Place-based hazards and problem frames provide evidence of a social factor impacting how the MCCAP agenda was widely perceived as a socially acceptable option for Nova Scotia municipalities, and how the MCCAP-gas tax mandate was broadly acted upon for this reason.

At both the municipal scale and provincial scale, historical focusing events played distinct socio-ecological roles in creating social contexts that enabled the development of the multi-level adaptation governance framework (Manuel-Navarrete and Pelling, 2015).

The evidence suggests that material differences in resources and funding may in part relate to autonomous adaptive capacity building efforts taken in response to historical focusing events. Discussion of socio-political factors related to municipality size and staff capacity for adaptation action, invoke contrasts with Jones (2012) arguments related to the importance of multi-level governance support for resources and staff capacity to address municipal issues of climate risk, even in large urban centres such as in Halifax and Vancouver, Canada as well as in Melbourne, Australia.

Investigating and assessing relationships in geographic and place based influences on adaptation policy-making and planning presents a ripe horizon for further research efforts to identify the social relationships between historic socio-ecological experiences with storm impacts in relation to multi-level adaptation governance policy developments, in order to comparatively establish broader patterns of causality across cases.

The MCCAP case substantiates that top-down multi-level adaptation governance frameworks can enable and advance local adaptation actions by setting agendas and framing problems for subordinate levels of governance (Corfee Morlot et al., 2009). The MCCAP gas tax mandate provides strong evidence of a powerful agenda setting and problem framing policy mechanism for Nova Scotia municipalities that surpassed the social issues associated with inducing autonomous adaptation by using a multi-level adaptation governance framework to incentivize adaptation planning and policy initiation at the local scale. In the case of Nova Scotia's adaptation agenda-setting process at both provincial and municipal scales, focusing events and past direct experiences with relatively rare occurrences of crisis or disaster had accentuated issues of risk and accelerated corrective policy and planning actions to be addressed through governance 'policy windows' and entrepreneurship (Kingdon, 2003; Birkland, 1998).

In the MCCAP multi-level adaptation governance framework, hierarchical policy power was used to link gas tax resource distribution to a provincial policy agenda for adaptation planning at the municipal scale (Horak, 2012, SNSMR, 2011). As the MCCAP evidence illustrates, in the absence of multi-level adaptation governance incentives, municipalities were seemingly constrained in their capacities to address issues of climate change risk,

except in rare instances of autonomous municipal institutional adaptive capacity building (e.g., Halifax, Municipality B). In pre-MCCAP instances where adaptation actions were reported to have occurred in response to past focusing events, there were material differences in staff capacity and resources.

Place-based variability in factors such as contextual climate change risks and hazards, and social abilities to cope and adapt to climate change, may relate to material differences in staff and capacity as a key social factor affecting how municipal adaptation planning and decision-making processes unfold at the local scale (Porter et al., 2015; Baynham and Stevens, 2014). Interviewees strongly affirmed the importance of the gas tax incentive, as well as focusing events, as influential social factors initiating and enabling the MCCAP planning process corroborating survey findings. Multi-level adaptation governance in Nova Scotia was mainly a municipal – provincial undertaking and adaptation agenda setting and problem framing evidence reflected this.

An enabling climate change adaptation governance framework such as MCCAP provides an important example of a multi-level governance policy directive giving incentive for municipalities to initiate adaptation-planning responses to contextual risk circumstances. Place-based geographic contexts of climate risk were observed as a contextual influence in the social landscape for adaptation agenda setting and problem framing, and the MCCAP. Interviewees discussed how past experiences with Hurricane Juan and recent experiences with Hurricane Arthur provided evidence influencing adaptation stakeholders' willingness to 'buy in' to adaptation policy and planning approaches, given first hand knowledge and direct experiences with the impacts of extreme weather.

This finding underscores the importance of contextual problem framing using place-based hazards as an impactful social factor for generating stakeholder support for multi-level adaptation governance frameworks. Several interviewees discussed how autonomous adaptation actions to hire additional staff in response to focusing events had been used as an adaptive capacity building strategy, in advance of the MCCAP. However, as already noted, these cases were exceptional.

Evidence of autonomous adaptive capacity building substantiates the focusing power that natural hazards can have in transforming local policy making processes (Manuel-Navarrete and Pelling, 2015). Place-based social values and norms can reflect post-disaster impact legacies. In response to past focusing events, interviewees reported how autonomous adaptation capacity building had occurred in rare instances. This finding highlights how focusing events can lead to municipalities' to autonomously agendas for raising adaptive capacity through added staffing to autonomously create social contexts for adaptation policy and planning initiation. Variance in staff resources and autonomous adaptive capacity building in response to focusing events are adaptation planning themes deserving of further inquiry in future studies of municipal adaptive capacity building in multi-level adaptation governance contexts.

The next section explores and describes how MCCAPs were developed and risks were prioritized; providing depth and context to explore and describe what social factors impacted how adaptation plans were produced across individual cases.

5.5 Adaptation capacity building: How are adaptation planning and policy options formulated? How are risks prioritized?

Adaptation policy, planning and capacity-building: online survey results (+75% agreement)
<p>Option formulation</p> <p>18/22 reported staff capacity-building through attendance and participation at municipally-focused meetings, conferences, workshops, and/or webinars (etc.) on topics of climate risk and adaptation planning as top planning techniques used to identify risks and prioritize actions in the MCCAP</p> <p>Risk prioritization</p> <p>19/20 reported staff knowledge and input was used to set MCCAP priorities</p> <p>16/20 reported committee round table discussions were used to set MCCAP priorities</p> <p>15/20 reported hazard, risk and vulnerability assessment ranking/rating systems were used to set MCCAP priorities</p>

Table 7: Survey findings of the impactful social factors impacting adaptation capacity building, risk prioritization and policy option formulation in Nova Scotia municipal adaptation planning processes

The survey results indicated internal staff knowledge, committee discussions, capacity-building and related external collaborations were impactful social factors enabling adaptation planning and policy making for Nova Scotian municipalities (See Table Seven).

All three municipalities profiled in the individual case analysis followed the MCCAP Guidebook provided by the province. To proceed with developing the MCCAP plan, the Guidebook offered a primary capacity-building tool that included a stepped planning framework for the formation of MCCAP committees that consisted of municipal staff, councilors, and in one individual case members of the public.

Municipal interviewees discussed impactful social factors in the MCCAP formulation and risk prioritization process. Capacity building and collaboration with academia, NGOs and the provincial government were widely discussed. At the municipal scale, two of the three municipalities explored in the individual case study analysis utilized internal staff and academic collaborations to formulate their MCCAPs, while two of the three municipalities specifically utilized the Hazard Risk Vulnerability Assessment (HRVA) climate change risk assessment process as a component of their MCCAP. One municipality worked in close collaboration with an external consultant to develop the MCCAP using the HRVA. Individual case findings shed insights into the social impact factors affecting municipal adaptation planning across cases. The importance of internal staff capacity and expertise and the contributive aspects of external collaboration to enabling robust municipal adaptation planning processes to occur were key themes discussed. The next section provides illustrative vignettes of MCCAP planning processes across individual cases.

5.5.1 Capacity, option formulation and risk prioritization: municipal analysis

5.5.1.1 Municipality A: MCCAP guide; committee round table discussion; internal staff led (planning); external academic collaboration

Municipal staff, under the lead direction of the land-use planner, prepared the final adaptation plan. In addition to internal staff planning processes using the committee approach, the land use planner from the first municipality described how an external partnership with an academic research project facilitated aerial LiDAR flood elevation mapping and was the key means for identifying risks associated with sea-level rise and storm surges in the municipality's MCCAP. In turn, this collaboratively conducted federal-provincial-academic flood risk scenario planning research project in the municipality was also discussed as an influential factor to identify risks and prioritize potential needs for adapting regionally significant transportation infrastructure beyond municipal jurisdiction or capacity for taking action. As a result the MCCAP identified municipal infrastructure, homes and businesses at risk of future flooding impacts with little capacity to reduce harm given the extra-territoriality of the climate risks.

5.5.1.2 Municipality B: MCCAP guide; committee round table discussion; internal staff led (sustainability planning); external academic collaboration

Flood risk scenario planning was conducted in the second municipality in collaboration with academia. However, in this instance the municipality autonomously funded the \$50,000 study. The added staff capacity of the sustainability planner to facilitate this academic collaboration in Municipality B contributed significantly to MCCAP development and the municipalities' abilities to comprehensively plan for climate change related risks at the local scale. The sustainability planner's role preparing the MCCAP also included facilitating broader community consultations to address contextual health and social vulnerability issues associated with adaptation. There was also discussion about how regional HRVA forums with neighboring municipalities informed a comprehensive internal strategic planning process to assess and prioritize climate change risk and priorities for action. The internal process included inter-

departmental consultation to assess infrastructure risks and inform prioritization processes. The sustainability planner self-acknowledged the added value that his presence added to internal staff capacity for facilitating academic and community collaborations in conducting a comprehensive municipal adaptation planning process. The councilor from the second municipality further corroborated the depth of the MCCAP as related to the presence of the sustainability planner:

I think there was a great collaboration between our staff, some professionals in the field who were not necessarily from the area that could come and do kind of nonbiased assessment of our environment and the risks, as well as some stakeholders. The average resident was asked and consulted as well. So, it was a really good collaboration, and definitely took a number of perspectives into account... It was quite an in depth process as well. I think ‘the sustainability planner’ had multiple meetings with the regional emergency management office, and the fire department, the police departments to make sure that we had plans in place, and that they all kind of aligned as well (Municipal councilor: September 23 2014).

5.5.1.3 Municipality C: MCCAP guide, committee round table discussion; External consultant led (HRVA process)

Municipality C collaborated with consultants to prepare its MCCAP utilizing HRVA techniques and facilitated roundtable discussions. The emergency management coordinator, as well as the CAO and mayor from this municipality all further discussed the HRVA process as a means for policy formulation. According to the emergency management coordinator interviewed, the HRVA process provided a comprehensive tool for identifying ‘what and where are the inherent risks and who and what is vulnerable in the impact areas’ (Emergency management coordinator: September 22, 2014). Subsequently, the HRVA offered a means for municipalities to ‘look at what is being done now to manage risks and develop incremental options for action (e.g., planning to move existing buildings, developing better evacuation planning)’; in contrast to implementing new or more expensive, prohibitive adaptation options such as developing coastal setback policies for new developments or constructing coastal defenses. The CAO from Municipality C who participated in the HRVA process, described it as follows:

CAO: The discussions that came out of it [HRVA] which were facilitated, that helped a lot. I mean, everybody who was on the committee had done the HRVA approach before, but it helped a lot having that to bring out the discussion... where we all might have rated something, but why... and what was the real reason. When we say ‘flooding’, it’s not really just generic flooding. It’s a specific brook with a specific issue and that breaks it down to something we can deal with...

Interviewer: So, it was helpful for conceptualizing the risk to the place.

CAO: Yeah, I think the analysis is a good place to start. But then I think you really have to have the discussions. Like I said, down there at one of our table discussions, we were meeting 6 to 8 hours in a session but people were not tuning out. We were meeting 6 to 8 hours because we were all engaged in a productive discussion. It was actually really good (Municipal CAO: September 24 2014).

Individual case analysis identifies the importance of the MCCAP Guidebook, and the enabling influence of external collaborations as impactful social factors in the MCCAP planning process. In the case of Municipality C, municipal capacity for ‘buy-in’ appears to have been achieved through outside consultant facilitation and the adaptation planning and discussion forum created by the multi-day, multi-stakeholder HRVA risk assessment process.

In contrast to Municipality B, Municipality C lacked the pre-existing, internal staff capacity for conducting rigorous and detailed MCCAP planning. In Municipality B, there appears to have been a material difference in staff capacity that enabled and enhanced institutional adaptive capacity building by facilitating the MCCAP process, including through external consultations and collaborations with academia, neighboring municipalities and the community. Municipality A’s external collaboration with academia to assess flooding risks contributed to formulating options and setting risk priorities for adaptation. However, there was a notable qualitative difference in the ‘robustness’ of MCCAP planning in Municipality A. This may relate to the social impact factor of internal staff capacity and contextual limitations that precluded more rigorous climate change adaptation planning using risk assessment such as HRVA process, utilized in the other two cases.

5.5.2 Capacity building, assessing options and setting priorities – non-municipal analysis

The provincial policy maker discussed how the MCCAP Guidebook was widely distributed to municipalities as the guiding framework for MCCAP reporting. The Guidebook recommended scientific baselines for planning, developed from Environment Canada climate change research findings related to the scientific probability of future occurrence of climate change risks and hazards in Nova Scotia. According to the interviewee, the Guidebook also provided a uniform scientific baseline and context for

municipalities to ‘branch out and broaden the scope of discussion’ pertaining to how climate change impacts may contextually affect municipalities.

The NGO representative interviewed identified widespread provincial capacity-building workshops, webinars and collaborative multi-stakeholder adaptation research initiatives as influential social factors affecting how the MCCAP policy-making process unfolded. The NGO interviewee identified 13 research projects conducted under the federally funded Atlantic Canada Adaptation Solutions (ACAS) project (2009-2013) as important capacity-building examples that broadly contributed to raising municipal knowledge, awareness, capacity and support for climate change adaptation prior to and during the MCCAP policy mandate at the provincial scale.

The consultant to Municipality C discussed how the HRVA process used in this case, shared overlapping similarities with the process recommended in the MCCAP Guidebook for risk identification and prioritization. The interviewee discussed how integrating the HRVA and the MCCAP process offered three advantages: 1. Eliminating redundancies and increasing efficiencies in the planning process; 2. Connecting relevant stakeholders from planning and emergency management and; 3. Framing climate change in a ‘emergency planning’ light to achieve greater stakeholder ‘buy-in’. The consultant discussed how HRVA served as an important formulation and prioritization process, but also a contextually significant social frame, to prepare multiple MCCAPs. The interviewee explained, ‘[people] are willing to come to the table and talk emergency management. It’s exciting to them - climate change is not. The framing was... perfect. We had buy-in right away, because of that approach’ (Consultant 2: September 26, 2014).

The consultant further described the major benefits of undertaking a collaborative HRVA/MCCAP planning process in a comprehensive and participatory forum for conceptualizing municipal adaptation as an incremental, integrated risk reduction approach. She described ‘creating a container for conversation’ to effectively facilitate inter-municipal staff communication through collaborations that raised staff capacity and awareness of the options for implementing adaptation through processes of incremental changes. She described how the MCCAP planning process improved opportunities for

inter-municipal communication processes involving emergency management and land-use planning. The interviewee elaborated how HRVA/MCCAP workshops provided a valuable forum for communication between staff emergency managers and planners. She provided examples of how inter-municipal communications facilitated collaboration to share planning resources such as population density maps for evacuation planning. She also discussed how changes to development approval processes could create opportunities for emergency managers to screen development applications in order to:

...have an opportunity to say: ‘does allowing this development in this location or in this way... is that going to exacerbate emergency issues...? Or not?’ I think that action item came up in more than one municipality of Nova Scotia... It’s just a matter of seeing how to change the practices ever so slightly. It doesn’t take much... (Consultant B: September 26, 2014).

Non-municipal interview findings indicate that provincial, non-governmental, academic and consulting collaborations contributed to raising municipal capacities for adaptation planning. Widespread provision of workshops, seminars, webinars and educational resources (e.g., MCCAP Guidebook) provided valuable opportunities for raising municipal adaptation capacities to under take the MCCAP adaptation planning process.

5.5.3 Across-case evidence summary and discussion: municipal adaptation option formulation and risk prioritization

In the case of Nova Scotia, the provision of capacity-building resources through the MCCAP multi-level adaptation governance framework (e.g. MCCAP Guidebook, stakeholder workshops, webinars) clearly served as key social factors impacting municipalities’ tasked with adaptation policy and planning. Capacity building activities bolstered municipalities’ abilities and capacities for rigorously assessing adaptation policy options and developing risk priorities. Additional capacity-building resources and support from academia and consultants also contributed to the MCCAP process across individual cases.

Corfee-Morlot et al., (2009) discusses how policy formulation involves stakeholder coordination to discuss policy priorities, implementation strategies and monitoring mechanisms. The individual case evidence suggests there is a diversity of approaches for formulating adaptation plans including through stakeholder collaborations with academia,

horizontally with regional municipalities and through consultant facilitation. Stakeholder engagement is further examined in Chapter Six.

Wu et al., (2010) describe that policy formulation is a process involving the generation of plausible policy choices to address a problem and a comparative assessment of the feasible policy options. The HRVA process was identified as a generative forum for addressing climate change risks and comparatively assessing and prioritizing actions for the adaptation plan. Academic collaboration and staff led MCCAP processes were described in two cases, while external MCCAP facilitation by a consultant was described in the third case.

Within multi-level governance institutions, public administrators working collaboratively, employing a diversity of techniques in order to generate and evaluate acceptable policy options is typically understood to be a primary mechanism for policy formulation (Howlett et al., 2009). The diversity of policy and planning approaches (See Table Eight) illustrated across the three individual cases of Nova Scotia's MCCAP processes generally aligns with this literature finding.

Social factors	Municipality 1	Municipality 2		Municipality 3
<i>External research and consulting collaborations</i>	Academic research collaboration aerial LiDAR mapping and risk assessment of coastal marshes of coastal marshlands subject to tidal flooding and regional infrastructure impacts	Paid academic collaboration (river flood study) of storm surge and inland flooding river scenarios	Regional HRVA	Consulting – HRVA (multi-day workshops with regional and municipal stakeholders)
<i>Multi-level governance capacity building resources</i>	Provincial capacity building resources: MCCAP guidebook, stakeholder knowledge forums, webinars, workshops			
<i>MCCAP process design</i>	Internal staff-led process	Staff led; included stakeholder consultations and community engagement		Consultant-led public participation on MCCAP committee

Table 8: Across case evidence summary of municipal adaptation policy formulation and risk prioritizations processes

The literature further suggests that small, specialized working groups composed of public officials are typically tasked with adaptation policy formulation (Penney and Wieditz, 2007; Henstra, 2012; Solecki et al., 2011; Mathew et al., 2011). Small roundtable discussions using a diverse variety of formats (e.g., HRVA, committees, external consultant and academic support) were widely discussed by municipalities as key methods for the assessment of policy-options and setting of adaptation priorities.

There was evidence of a variety of planning tools, options and formats used to formulate adaptation policy options by assessing risks and developing priorities for the adaptation actions. MCCAP individual case study evidence establishes and affirms concretely that internal staff and council were enabled by the provincial multi-level adaptation governance framework (MCCAP mandate) and capacity building resources (Guidebook). Research discoveries offer evidence of capacity building through external stakeholder collaborations' as impactful social factors affecting municipal adaptation planning (e.g., academia in two cases, consultants in one case, provincial government in all cases).

The literature suggests that the prioritization of adaptation policy options lacks a standard method with techniques differentiating across policy domains and jurisdictions (Corfee Morlot et al., 2011). The evidence in the individual cases indicates that two MCCAPs utilized the HRVA format as a contributive risk prioritization tool. In Municipality B, the HRVA was conducted regionally and added additional rigor an iterative and dynamic MCCAP planning strategy facilitated by the added staff capacity of a sustainability planner. This contrasted with the consultant-led HRVA process in Municipality C and the collaborative academic partnership and land-use planner led adaptation planning strategy used in the Municipality A.

Risk management, alternative scenario planning and stakeholder consultation and communications, cost-benefit analysis are some examples of planning approaches described in existing adaptation literature as publicly and politically feasible methods for developing adaptation planning and policy making options and priorities (Picketts et al., 2012; Matthews et al., 2011; van Aalst et al., 2008; Noble et al., 2005). Flood risk scenario mapping, external stakeholder collaborations and consultations and municipal

and regional scale HRVA processes were some of the specific methods mentioned across individual cases. Nova Scotia municipal adaptation survey results indicated that an increased awareness of hazard proximity raising critical infrastructure and public safety concerns were top criteria used in prioritizing climate change risks and municipal adaptation actions. Municipalities varied in the planning methods used to formulate and prioritize risks in MCCAP plans, but shared common access to capacity-building resources from the province. There was a generally positive sense among interviewees that the gas tax funding requirement and provincial capacity support for adaptation planning were co-beneficial and mutually reinforcing aspects of the MCCAP multi-level adaptation governance framework. The MCCAP planning process provided an insightful opportunity for initiating municipal adaptation planning and policy option formulation processes that allowed for the generation of new information to inform future planning and policy making for dealing with climate change risks at the local scale, in Nova Scotia coastal contexts. Figure Six below offers a conceptual illustration of the social impact factors affecting municipal adaptation policy option and risk prioritization processes.

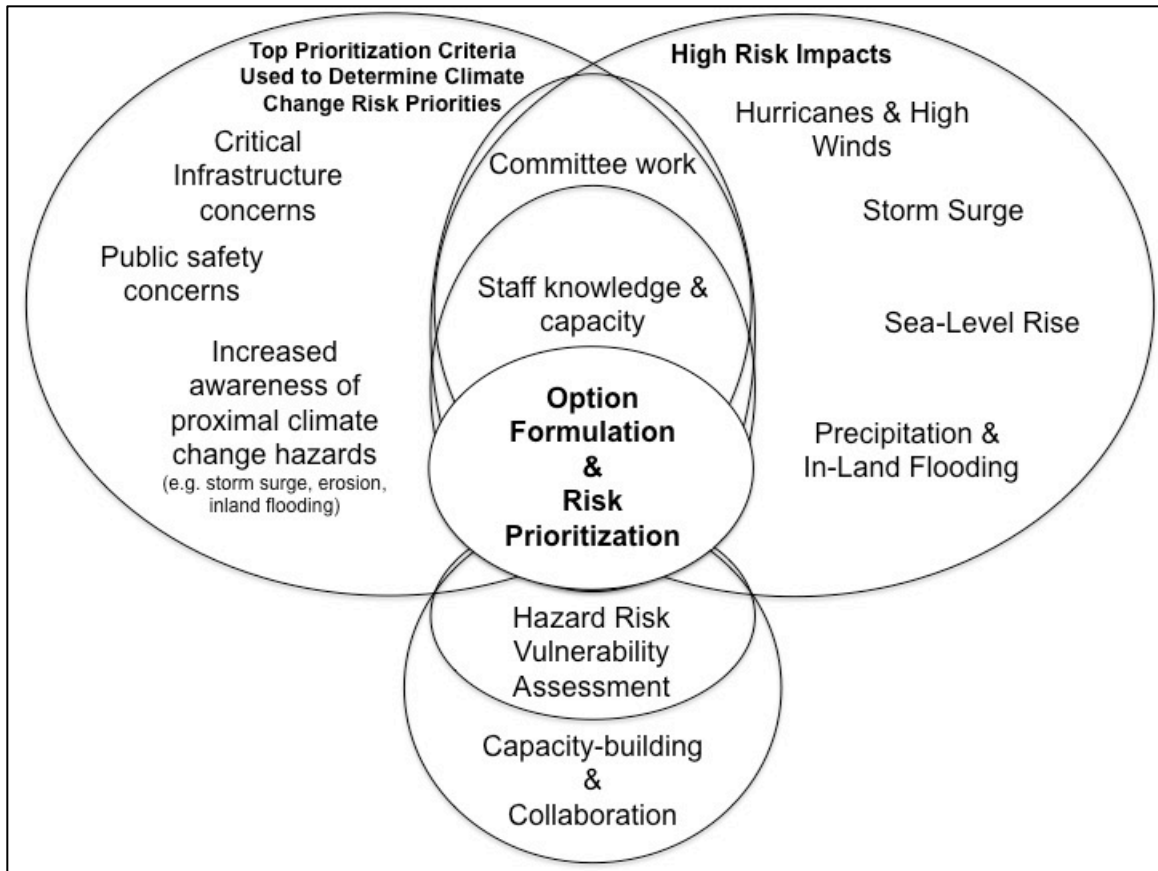


Figure 6: Conceptual illustration of social factors impacting municipal adaptation capacity building, policy formulation and risk prioritization in Nova Scotia, Canada

5.6 Summary

This Chapter has constructed and manifested an unorthodox qualitative research approach for exploratory depth description of prioritized social factors impacting municipal adaptation planning processes. The evidence suggests that in the case of Nova Scotia, adaptation policy initiation through a multi-level governance financial incentive acted as a critical pre-condition for the initiation of adaptation policies and plans in municipalities. However, the contributive aspects of recent and historical ‘focusing’ events also noticeably helped to set the agenda and frame the problem for municipal climate change planning. This chapter has raised discussion of the material differences in staff capacity between individual cases of municipal adaptation planning processes. The evidence suggests that the sustainability planner in Municipality B clearly contributed added value to the MCCAP process that was not apparent in either of the other two cases.

The abilities for municipalities to respond to the MCCAP multi-level adaptation governance incentive varied according to municipal resources, in particular staff capacity. This finding aligns with the findings of other adaptation cases studies (e.g. Porter et al., 2015; Baynham and Stevens, 2014) that indicate key roles for multi-level governance to manifest and distribute resources that enable adaptation at the local scale, including generic human resources and staff capacity (Jones, 2012).

A ‘soft-path’ process of adaptation includes capacity building and incremental changes to planning may enable institutional adaptive capacity strengthening through designated staff to facilitate and enable climate adaptation discourses internally within the municipalities tasked with undertaking the MCCAP. The evidence suggests that social factors such as added staff capacity may impact municipalities’ abilities for the integration of adaptation concretely into planning and policy-making documents. This theme of inquiry is worthy of future research to determine correlation between levels of municipal staff capacity and the variability in municipalities’ abilities to concretely integrate climate change adaptation into operational decision-making, land-use planning and emergency management, infrastructure development and so on.

The formulation and prioritization of municipal adaptation risks, closely aligns with the provision of capacity-building resources enabled through MCCAP multi-level adaptation governance approach. The MCCAP Guidebook clearly served as a social impact factor for enabling all municipalities’ tasked with adaptation policy and planning as a literal guide for the formulation of adaptation planning processes and policy options to develop risk priorities and adaptation actions using small committee roundtable discussions. This finding aligns with previous literatures related to how enabling support for local adaptation policy formulation and risk prioritization can be manifested in multi-level governance contexts (IPCC, 2014).

The unique social contrasts and qualitative differences in the design of adaptation planning processes between Nova Scotian municipal cases (e.g., two internally led processes, one consultant led process; two HRVA processes; two academic collaboration processes) provides new insights into the social contexts of nascent processes of

adaptation planning. The evidence suggests roles for both internal staff capacity and external collaboration in facilitating adaptation planning. Multi-level governance frameworks for enabling climate change adaptation should take note of the importance of capacity-building support and the importance of internal ‘change agents’, such as the sustainability planner in the second municipality, as a notable example of a social factor that enables the conditions necessary for robust adaptation planning processes. Giving additional recognition to the influential policy power of external collaborations (e.g., consultants, academics) to contribute to the development of adaptation policy options and formulation of priorities broadens the scope for future research. More knowledge is needed about the relative influences of internal staff capacity and external collaborations as contributing factors to the variation in the policy quality and potential for implementable adaptation policy options in comparative cases.

Using Moser’s four categories of interest for adaptation case research (2009) it is clear in the case of Nova Scotia that the construction of the adaptation decision-making arena predominantly related to the imposition of the MCCAP gas tax policy mandate. The MCCAP itself was a policy response to previous, place-based focusing events (e.g., Hurricane Juan). Post-Juan, a multi-year, multi-stakeholder social landscape developed a unique underlying social context for adaptation policy-making that contributed to the development of the multi-level adaptation governance context. In Nova Scotia, the imposition of a mandatory climate change planning reporting requirement motivated by a monetary incentive was not viewed as an onerous or coercive policy by municipalities tasked with the completion of the MCCAP by the province. In this case, the agenda-setting policy power related to resource distribution in multi-level governance contexts was complemented by a unique and embedded socio-ecological and place-based risk context that created a fertile social landscape for provincial adaptation policy-making to support municipal adaptive capacity building (Manuel-Navarrete and Pelling, 2015; Horak, 2012; Jones, 2012).

This affirms findings from Hanna et al., (2014) who determined that provincial policy-making was a major contributive factor to municipal scale adaptation agenda-setting and policy development. This study adds qualitative depth insights into the actual adaptation

planning processes based on observations and analysis of the unique multi-level adaptation governance context of Nova Scotia, Canada.

Top-down, organizational mandates contributive to the bottom-up consolidation of risk knowledge using a variety of methods (IPCC, 2014) is clearly demonstrated in the MCCAP case of Nova Scotia. It was observed in this study that there were material contributions of internal municipal staff and external stakeholder collaborations that qualitatively influenced adaptation planning and decision-making processes. Plausibly, these social forces affected the actual decision-making outcomes of the MCCAP process. This research adds depth to the findings of Hanna et al., (2014) by illustrating how and what social factors may contribute to qualitative variations and diversity in municipal adaptation planning processes. The study further verifies that autonomous adaptation policy-making efforts (e.g., enhancing staff capacity to address contextual climate risk issues) in the absence of multi-level governance mandates may be as a response to focusing events (Bassett and Shandas, 2010). The agenda-setting and problem-framing policy power of the MCCAP highlights how hierarchal dimensions of resource distribution are contributive to initiating the development and implementation of the MCCAP adaptation policy and planning options at lower levels of government. The MCCAP also exhibited the simultaneous deployment of widespread institutional adaptive capacity building. The MCCAP mandate was further enabled by the pre-existing ICSP gas tax-reporting requirement. Iterative use of provincially delegated resource distribution authority and policy power was observed to set an agenda and frame the adaptation problem for municipalities using the gas tax to monetize adaptation planning and coordinate the development of adaptation policy priorities for municipalities (Horak, 2012; SNSMR, 2011).

The MCCAP governance framework had the benefit of the fact that municipalities were already pre-accustomed to the multi-level reporting requirement of the gas tax/ICSP mandate. MCCAP social acceptability was further enabled by a widespread, socio-ecological climate context of past experiences with ‘focusing events’ - place-based hazards and risks in Nova Scotia - that in turn contributed to widespread, willful municipal compliance with the MCCAP mandate. The financial incentive created by the

MCCAP linkage to funding further provided a powerful socio-political ‘stick and carrot’ for adaptation planning uptake in municipalities. In a sense, the MCCAP at the provincial scale meets Manuel-Navarrete and Pelling’s (2015) definition of a deliberate transformation, in that the MCCAP was a purposefully initiated multi-level governance change carried out by human agents in an attempt to reduce inequalities in capacities for climate risk reduction. This policy innovation was triggered, at least indirectly, as a response to past impacts associated with hurricanes (e.g., Juan) and growing concern over climate impacts in Nova Scotia municipalities’.

Within the broader MCCAP context, individual case findings suggest there was tangible, notable importance of the presence of a sustainability planner in one case. This social factor contributed to a more robust and dynamic MCCAP planning process, and relatedly added capacity for ‘soft’ process implementation of measures via incremental changes to municipal processes and procedures (e.g., bylaw revisions) in contrast to the other municipalities lacking this added staff capacity. This finding aligns with Porter et al., (2015:421) who contended that ‘...‘generic’ human development capacities such as financial and human resources and those ‘specific’ to climate adaptation including disaster planning... and scenario development’ were important social factors impacting the integration of climate change planning at the local scale in the UK and deserving of wider comparative assessment. Nova Scotia, Canada affirms the need for human resources as a part of adaptation capacity building at the local scale.

Making this assertion is deemed justifiable given previous case methods that used high adaptive capacities as means for policy-inference comparison (Biesbroek et al., 2010; Haddad, 2005). Local adaptation case study evidence from both Canada and the UK now begins to address Baynham and Stevens (2014) call for in-depth scholarly examinations and illustrations of the roles that municipal planning capacity plays in policy making, and the social influences that affect local decision-makers’ perceptions of climate change risk.

In this study, social impact factors affecting the materially different outcomes of municipal climate change planning developments included internal staff capacity and external collaborations. Further description and exploration of how adaptation policy

options, mechanisms and responsibilities are differentially developed and shared across governance levels responds also to calls in the literature for documented examples of multi-level adaptation governance (IPCC, 2014; Biesbroek et al., 2010). In the next Chapter, municipal adaptation policy integration barriers and opportunities, stakeholder engagement, public participation and political support are further documented, examined and discussed.

In sum, this Chapter has diagnosed the ‘important’ social factors that contribute to municipal adaptation policy and planning development from the municipal and non-municipal perspectives. The Chapter responds to Burton (2009) and Leck and Simon (2013) who both have called for research that can produce knowledge to strengthen understanding of multi-level governance collaboration to overcoming policy impediments and barriers, to support local level institutional adaptive capacity building for climate action.

The case of Nova Scotia’s multi-level adaptation context and municipal adaptation planning approach indicates and provides strong evidence that hierarchal differences in governance policy power and resource distribution can serve to set agendas for initiating and capacitating local scale social conditions for adaptation. Sociable adaptation planning enables capacity-building collaborations and adaptive capacity building processes to identify risks and develop options and priorities for adaptation at the local scale in municipalities.

The Nova Scotia MCCAP case empirically fills a research gap (e.g., IPCC, 2014) by demonstrating a clear case of a multi-level adaptation governance model that provided municipalities an opportunity to gather contextual information and raise stakeholders’ awareness. The adaptation planning process supported the development of adaptive capacity via climate change risk assessment contributing to adaptation policy option formulation and action prioritizations with future applications for policy reform and inter-governmental advocacy for funding.

In a pragmatic sense, this empirically documented example of a multi-level adaptation governance approach, and the social factors impacting municipal adaptation planning,

contributes to narrowing the analytic scope for the future inferential determination of social factors that contribute to variations in municipal adaptation policy-making. In this way, the study incrementally contributes to ground adaptation theory building (Gupta, 2012), particularly in regard to the social factors that affect and impact municipalities' capacities for adaptation policy and planning in multi-level governance contexts. Gathering and assessing further evidence related to the social factors that enable municipal developments of regulations, instruments and incentives for the integration of adaptation policies and practices requires continued exploration and description of how differences in staff capacity and resources may affect municipalities' abilities to address local climate risks through policy integration.

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Chapter Six

6 Adaptation integration: Stakeholder engagement, public participation and the barriers and opportunities for adaptation planning and policy integration in municipalities of Nova Scotia, Canada

6.1 Introduction

This Chapter continues the case study analyses of municipal adaptation planning processes in multi-level governance contexts, exploring and describing the MCCAP case from Nova Scotia, Canada. This chapter specifically provides survey results and comparative individual case analysis and conceptual discussion of interview findings to illustrate and discuss social factors impacting the Nova Scotia multi-level adaptation governance framework at the municipal scale. Municipal cases for across individual case analysis include: i) Amherst, located in tidal marshland potentially subject to the historic risks of overland flooding impacts associated with climate change; ii) Shelburne, located on a deep water harbour with a historic waterfront highlighting exposure and vulnerability to the coastal climate and weather of the North Atlantic Ocean; and iii) Bridgewater, located on either side of the LaHave, a tidal-river of the Atlantic subject to both overland storm-water run-off and storm surge related flood dynamics associated with hurricanes, potentially impacting vulnerable transportation infrastructure.

The conceptually thematic framework is utilized to compare findings across individual cases, providing an opportunity for offering in-depth illustrations of iterative and aggregate level online survey findings (a 36% representative sample of Nova Scotia municipalities); by describing and exploring in depth the adaptation policy and planning development process at the municipal case level. Using interview data collected from municipal and non-municipal adaptation stakeholders in Nova Scotia (n=10 interviewees) to identify patterns, similarities and differences, illustrative individual case comparisons allow for across-case analysis of key prioritized social factors identified in the survey as worthy objects for more granular research exploration at the individual case level.

This exploratory, descriptive approach to within ‘across individual case’ analysis considers the aggregate case of the Municipal Climate Change Action Planning (MCCAP) multi-level adaptation governance framework, and the within MCCAP, individual case level of three purposively selected Nova Scotia municipalities; as well as the external perspectives of non-municipal stakeholders. In the unique adaptation case study research context of Nova Scotia’s MCCAP, prioritized online survey results investigated at municipal level benefit from the quasi-independent variable (e.g., the MCCAP policy mandate) adding comparative reliability to the studies’ previous description and exploration of the social factors impacting initiating municipal adaptation and enabling adaptation capacity-building. Three individual cases of vulnerable, coastal municipalities of Nova Scotia, Canada provide depth illustration and contextual insights.

Conceptual themes addressed in this chapter relate to municipal adaptation planning and policy integration. It is proposed that adaptation policy and planning implementation in municipalities can be enabled through both conditional and sustained provision of capacity-building resources, provided through multi-level governance funding approaches. The iterative survey evidence scopes the municipal and non-municipal interview summaries presented under the adaptation integration sub-themes. This includes: i) stakeholder engagement; ii) public participation; and, iii) the barriers and opportunities for adaptation planning and policy integration in Nova Scotia municipalities. Political support and leadership survey results and interview findings are analytically explored and described.

Throughout this chapter, online survey results and interview summaries preface more rigorous discussion of the individual cases, externally, and in relation to broader conceptual discussion of social processes of multi-level adaptation governance. It is acknowledged that the research bias of this case study is affected by the choice of the targeted sample: municipal planners involved with the production of municipal adaptation plans within the multi-level adaptation governance context of Nova Scotia, Canada. However, triangulation with other sources of data (e.g., content analysis, focus group findings, non-municipal interviewees) adds reliability to the study’s findings.

6.2 Adaptation integration: How are stakeholders engaged in the adaptation policy-making and planning process?

Online survey results indicated that the stakeholders prioritized for consultation in the preparation of the MCCAP plan included, in order of importance: i) other municipal departmental staff (planning, engineering, maintenance, recreation, protective services – 19 of 20 survey responses); ii) external municipal stakeholders (emergency measures organizations, neighboring municipalities and regional planning commissions – 16/20); iii) provincial government officials (e.g., Municipal Affairs, Environment, Natural Resources, Agriculture – 15/20); and iv) members of municipal council (15/20).

Sixteen of nineteen respondents also identified that, following the completion of the MCCAP, adaptation policy integration into municipal decision-making and planning processes had occurred, or was occurring, either informally or formally. All 19 respondents unanimously affirmed that, from both an individual municipal and regional perspective, ensuring that climate change adaptation and mitigation planning and policy objectives were considered during municipal budgeting and capital planning was the most important social factor affecting continued advancement of the MCCAP. Moving the MCCAP from plan to political priority was perceived to require allocations of funding for the implementation of adaptation actions, and there was contextual potential for leveraging opportunities to implement adaptation responses to shared climate hazards at the regional scale, particularly through regional emergency measures organizations.

These online survey results indicate the importance municipalities placed on regional responses to climate change adaptation, and the importance of integrating adaptation into day-to-day decision-making and operational processes via inter-departmental stakeholder collaborations, budgeting processing with municipal councils, as well through inter-municipal collaborations and relations with the provincial government.

6.2.1 Stakeholder engagement: municipal analysis

Based on the online survey results, it was determined that municipal staff and councils, as well as neighboring municipalities and relevant provincial government departments were important stakeholders involved in the MCCAP planning process. Table Nine below

cross-documents and enumerates aggregated, municipal interviewee responses across cases related to relevant stakeholders engaged in MCCAP preparation. This interview evidence largely corroborates and verifies the online survey results related to MCCAP preparation processes and the important stakeholders that were consultatively engaged in adaptation planning. These findings are further supported by the content analysis results provided as background information in Chapter Two and in Appendices B1-B4.

Internal	External
<p>Departmental staff [x3]</p> <p>(Planning, Engineering/Public Works, CAO)</p> <p>Municipal councils</p>	<p><i>MUNICIPAL LEVEL:</i> Regional emergency management offices [x4]</p> <p>Neighboring municipalities [x3]</p> <p>Water utility & wastewater authorities [x2]</p> <p>Local business associations [x2]</p> <p>Emergency services (Police, Fire)</p> <p>Public health authority</p> <p>Environmental planning working group</p> <p><i>NON-MUNICIPAL STAKEHOLDERS</i></p> <p>Local environmental groups (x2)</p> <p>Planning consultancy</p> <p>Rail authorities</p> <p>Public representatives on MCCAP committee</p> <p><i>PROVINCIAL LEVEL:</i> NS Department of Community Services</p> <p>NS Department of Agriculture</p> <p>NS Department of Transportation</p>

Table 9: Municipal MCCAP stakeholder collaborations mentioned in interviews

In the case of Nova Scotia's MCCAP, the planning process was largely an internally driven process led by planning staff; involving internal stakeholder engagements with municipal staff and councils, and horizontally with neighboring municipalities. Some engagement vertically with relevant provincial government departments was reported. External stakeholders also included consultants and/or other external collaborators from

academia and NGOs that added additional expertise and capacity for municipalities to comply with the MCCAP reporting requirement through regional adaptation planning approaches and external support.

6.2.1.1 Municipality A: External stakeholder engagement and the extra-territorial risks associated with adaptation planning that necessitated regional collaboration

In Municipality A, external stakeholder engagement was observably important given the extra-territoriality of potential risks of climate impacts related to risks associated with flooding in impacting the municipalities' water and waste-water infrastructure located in vulnerable locations along the borders of the municipality.

For these reasons, external collaborations with adjacent municipalities, academia, non-governmental working groups and higher levels of government with extra-municipal policy jurisdiction were deemed to be an important aspect of the municipal adaptation planning process. However, the land use planner in this municipality discussed how lack of time and resources undermined the potential for broader, long-term adaptation policy-making success. Provincial leadership and outside stakeholder engagements and collaborations were perceived to be important for integrating adaptation. In this municipality, there was a need to have access to technology to better understand climate change risks and make informed municipal planning decisions. This municipalities' close proximity to regionally significant transportation infrastructure (e.g., a national rail and highway corridor), also accentuated the needs for greater external collaborations due to the lack of direct municipal policy jurisdiction over critical infrastructure, potentially vulnerable to significant regional climate change risks.

6.2.1.2 Municipality B: broad-based stakeholder engagement related to added staff capacity

In the case of Municipality B, the pre-existing staff capacity of the sustainability planner amplified the potential for conducting both internal and stakeholder engagements. A broad-based consultative approach to rigorously engaging a breadth of

stakeholders in assessing risks, formulating options and developing priorities for municipal adaptation was described.

The sustainability planner in Municipality B identified a key gap in the MCCAP process related to provincial ‘overlap’ in the process that was necessary for preparing the adaptation plan. The interviewee reported a lack of access to municipal climate change information necessary for preparing the plan, raising the functional municipal need for engaging with various different provincial government departments in order to attain data and information necessary for conducting robust and rigorous municipal adaptation planning. However, the interviewee reported how horizontal departmental ‘silos’ of communication at the provincial level impacted municipalities’ abilities to conduct well-informed, integrated municipal adaptation planning processes.

6.2.1.3 Municipality C: Regional stakeholder engagement through outside facilitation

In Municipality C, stakeholder engagement at the regional scale using external consultant facilitation to assess risks, develop policy options and prioritize risks was observed. The social benefits of externally facilitated integrated risk assessment and adaptation planning processes was discussed as a materially significant social factor related to capacity building through stakeholder engagement contributive to the regional integration of adaptation in the case of this municipality and its neighboring collaborators.

6.2.2 Discussion: Stakeholder engagement and adaptation policy integration

Individuals, groups and organizations affecting policy development and implementation can impact the feasibility and perceived legitimacy of policy options, often acting as a powerful influence upon policy outcomes (Bryson, 2004; Van Horn et al., 2001; Wallner, 2008; McConnell, 2010). The reasons explaining how and why stakeholder engagement in adaptation planning and policy-making is important synthesized from the literature include that: (1) stakeholders possess specialized local knowledge about climate change impacts and can offer valuable expertise; (2)

stakeholders working together builds trust and strengthens the legitimacy of policy choices; and also, (3) building multi-stakeholder support expands the political salience of adaptation, providing increased or added incentive for elected officials to devote further attention to the issues (Sherman and Ford, 2014; Tompkins et al., 2008).

The individual cases suggest that while the MCCAP process exhibited many positive social attributes, stakeholder engagement was hindered by institutional constraints. This MCCAP case illustrates the symptoms of functional fragmentation of modern governments and how poor horizontal and vertical coordination between levels of government can hinder overall policy effectiveness. These social factors have been noted elsewhere in adaptation literatures as constraining factors related to stakeholder engagement in multi-level adaptation governance contexts (e.g., Jordan and Lenschow, 2010). The Nova Scotia MCCAP case results indicate differences in policy power and resource distribution between orders of government and also mirror findings from Norway that suggested while financial support from higher levels of government can be the key catalyst for initiating the development of local, municipal climate change plans, implementation of plans is often stalled due to lack of governance coordination and lack of continued funding and support for implementation programs at the local scale (Aall, 2012).

To concretely illustrate how the multi-level adaptation governance constraint related to horizontal alignment and policy congruence at the provincial level, Consultant B to Municipality C pragmatically noted that much of the required knowledge and expertise necessary for the MCCAP preparations already resided within the departments of provincial government. The interviewee held the opinion that it was unrealistic and redundant to expect that municipalities would have the capacity, resources, time and/or expertise to adequately assess the complex uncertainties associated with many local climate change risks in preparing MCCAPs. The consultant commented:

It's not their [municipalities] job, and that's the thing. The province should have done coastal erosion assessments... The province should have done ground water assessments for vulnerability and given it to the municipalities. That's what we learned in the MCCAP process. The province needs to provide this to municipalities. They are the ones with the expertise... the ones with the information. I hope that that's one of the things that comes out of the MCCAP process (Consultant 2, September 26 2014).

These comments strongly indicate the need for follow-up clarifications of inter-jurisdictional policy responsibility to ensure policy congruence and alignment in future iterations of multi-level adaptation governance in Nova Scotia. Lack of horizontal congruence at the provincial scale was perceived as constraining factor on municipal adaptation planning, highlighting how policy power differences in multi-level governance systems relates to jurisdictional silos and institutional communications barriers that act as serious impediments to coherent multi-level adaptation governance policy frameworks (Horak, 2012).

Having access to broader expertise through multi-stakeholder engagement collaborations also appears to have been a socially important aspect impacting adaptation plan development and the potential for policy integration into the day-to-day activities of municipalities' in the broader multi-level adaptation governance context of Nova Scotia municipalities. Adaptation stakeholder engagement can be conceptually understood as an important social condition affecting adaptation integration in Nova Scotia's municipalities. The evidence suggests better multi-level stakeholder institutional engagement is required to provide policy coherence contributive to adaptation integration in municipal governance processes.

The qualitative robustness of Municipality B's MCCAP planning processes were deemed to be related to the presence of the sustainability planner added staff capacity, thus providing preliminary evidence of a materially important social factor affecting the quality of municipal adaptation stakeholder engagement policy-making processes and approaches. However further research pertaining to the interconnectivity between staff capacity and adaptation planning processes is required in order to more rigorously assess the broader relativity of this emerging conceptual proposition related to the municipal staff capacity factors enabling the integration of adaptation plans and policies at the municipal scale.

This engagement aspect of the MCCAP process highlights a multi-level governance barrier related to horizontal policy congruence. In other words, there was a municipal perception that in the MCCAP mandate requiring municipalities to develop adaptation

plans, the provincial authorities had not adequately addressed the need for cross-departmental communications to ensure aligned information provision that was required for municipalities' to prepare the plans. These 'communications gap' concerns were also widely raised by the CAO in Municipality C, the emergency measures coordinator for Municipality B and C, the land-use planner in Municipality A and Consultant B.

By including a broad range of stakeholders affected by adaptation policies or whose interests are affected by adaptation interventions, social contributions are achieved that add to broader stakeholder 'buy-in' to the adaptation process, and conceivably the likelihood of adaptation policy success achieved through multi-level stakeholder engagement in multi-level adaptation governance contexts (Corfee Morlot et al., 2009). The Nova Scotia individual MCCAP cases exemplified a diversity of approaches in stakeholder engagement techniques related to the variability of municipality's adaptation planning process choices, and the contextual limitations and opportunities associated with social variance in these individual cases. However, there were commonalities in the desire of municipalities for provincial leadership to ensure coordinated access to information and resources for enabling continuation of the municipal adaptation policy agenda through capacity building and opportunities for integration through implementation. Stakeholders' desires for follow-up provides an indicator of MCCAP policy success and highlights opportunities for continued municipal adaptation policy development and potential for continuing to use the gas tax reporting requirements as a means of implementing adaptation policies, through the continued development and implementation of adaptation policy monitoring and evaluation tools. Using the gas tax, or other leveraged financial incentive structures, can be contributive to achieving multi-level adaptation governance policy goals and objectives (e.g., municipal infrastructure vulnerability assessment and risk prioritization).

As climate change adaptation presents risks for many municipal services, cross-scale governance coordination requires multi-stakeholder engagement to address risks outside of the policy power of municipal jurisdiction and resource access. Broad-based stakeholder engagement is perceived to be an important part of the formulation and integration of adaptation planning and policy-development at the local scale. The social

benefits of raising stakeholders' awareness of climate change risks and opportunities for adaptation governance improvements through gathering, discussing and improving communications across government was perceived as a potentially contributive factor for improving municipalities' overall adaptive capacities' for regional risk reduction and adaptation, in the case of Nova Scotia.

6.3 Adaptation integration: How is the public engaged?

Ten of twenty survey participants agreed with a narrative characterization that there was a 'medium' level of consultation of the local public in the preparation of the MCCAP. 'Medium' consultation was narratively describes as where public participation was constrained by limited time, capacity-resources and/or limited public interest (factors previously identified in focus groups). The fact that this result is based on a 36% representative sample of Nova Scotian municipal opinion indicates that in the case of the MCCAP, public participation did not play a significant role in the adaptation planning process (and this is corroborated by evidence generated via content analysis and focus groups). In the Nova Scotia MCCAP adaptation planning process, public participation was not conducted universally across municipalities.

6.3.1 Public engagement: non-municipal analysis

Interviewees discussed how public participation was not made a mandatory requirement as a part of the MCCAP. There was a general perception among most interviewees that conducting public consultation in advance of first developing an internal, high-level assessment of climate change risks, hazards and impacts to municipalities could have created elevated public expectations or detrimentally appeared alarmist in the eyes of community members, detracting from the objective of the MCCAP to assess and prioritize municipal adaptation needs and actions.

According to the provincial policy-maker interviewed, public participation was not made a mandatory requirement of the MCCAP due to an interest for 'municipalities to look at those things that were directly under municipal jurisdiction' such as climate change risks to municipal infrastructure. The interviewee also noted that mandatory public consultation requirements had been required in past municipal planning processes (e.g.,

ICSP gas tax mandate); so, therefore the province was not as concerned about public engagement on environmental issues in this mandate.

The policy maker also described a desire not to create ‘elevated expectations’ among public stakeholders (including coastal landowners) in municipalities’ capabilities to provide individual remedies to issues associated with climate change risks and hazards. These were some reasons identified from the provincial perspective, for not requiring mandatory public participation. Despite public engagement not being required in the MCCAP, the interviewee emphatically noted that public safety and community well-being figured prominently developing MCCAP priorities in all municipalities.

Consultant A described how in the regional adaptation planning processes he facilitated, community mapping (not considered in the profiled municipal individual cases) had been utilized in the MCCAP preparation processes as a ‘public education’ tool to begin to document existing risk and hazard issues as baseline information for monitoring local climate change impacts over time. The consultant expressed the optimistic opinion that: ‘more information allows people to make better decisions’, and public participation and crowd-sourced information regarding local climate change risks and impacts provided a means of generating data and consolidating information to inform future decision-making processes. The consultant described how in the MCCAP processes he facilitated, a series of public meetings to educate the public about climate change were conducted and community mapping of current and projected impacts was then conducted as a means of increasing public understanding and starting a process of community documentation (e.g. frequency of events and impacts), that over time, could create baseline information to inform future planning and land-use decision-making.

In a contrasting viewpoint, consultant two expressed ‘total agreement’ that the MCCAP process did not need to be a public process. The consultant mentioned concerns regarding the quality of information produced through public consultation on complex planning issues, such as coastal erosion or groundwater depletion, that first required expert assessment and interpretation.

The NGO representative agreed that MCCAP process had less public participation than the ICSP process, noting that it was not made a required part of the process. However, the respondent also identified examples of MCCAP committees that had included academic and public participants. Variance in public participation in the adaptation process across cases of municipal adaptation planning is further explored and described briefly in individual case vignettes below.

6.3.2 Public participation: municipal analysis

6.3.2.1 Municipality A and B: adaptation public consultation, alarmism, information quality and the education-first approach

When queried regarding the role of public consultation in the preparation of the MCCAP, the land-use planner interviewed in Municipality A expressed a hesitancy with conducting public consultation as a part of the MCCAP process without having a real understanding of the risks and the probabilities of climate change impacts, as well as a fear of building public expectations or appearing ‘alarmist’ in the eyes of the community.

Similarly, the sustainability planner in Municipality B commented that existing knowledge of community hazards were validated in one public session; however the quality of publicly provided information related to hazards was informal and imprecise. The interviewee also shared the land-use planner’s concern that conducting public consultation on climate change hazards and impacts without first conducting expert consultation could raise public expectations, or appear ‘alarmist’ in the eyes of the community. Both interviewees noted that public consultation was not a requirement of the MCCAP, but the sustainability planner suggested that the MCCAP’s completion had provided subsequent opportunities for the MCCAP to serve as an ‘educational tool for the community’ to raise public education and awareness related to local climate change issues.

6.3.2.2 Municipality C: A public committee, a rushed and open process and future opportunities for integration

The CAO of Municipality C noted that their MCCAP process did not include any public consultation sessions. In contrast, there were two public members on the MCCAP committee, and committee meetings were open to the public. The CAO noted that time constraints prevented more rigorous public engagement in the planning process, while expressing that ‘not everybody is interested’ in participating in early-stage planning versus participating in more concrete project discussions. The mayor from the same municipality corroborated the CAO’s comments, noting that MCCAP public consultation was not required and while there was a lack of time for broader engagement, there was public representation on the MCCAP committee and future land-use planning reviews presented further opportunities for conducting public consultations on MCCAP related topics, such as flood prevention in drainage ditches and land use bylaw reviews to address waterfront risks and hazards.

6.3.3 Discussion: public participation

Public participation in policy making and planning is perceived to increase public education and provide a means to assess the social acceptability of policy options, while enhancing the perceived democratic legitimacy of policy making decisions (Walters et al., 2000; Irvin and Stansbury, 2004). Increasing public awareness of climate change risks, generating public support for adaptation planning and policies, while publicly legitimatizing and raising political support for the allocation of scarce resources to adaptation priorities, are conceived to be social benefits of public participation in adaptation planning processes (Few et al., 2007).

However, participation and public processes are also not uniformly utilized to develop adaptation policies or plans, nor do they necessarily lead to better outcomes (Swart et al., 2014). Lund et al., (2012) found that only 42% of Danish local governments utilized public engagement in adaptation planning, because of the perception that the public was disinterested.

In the case of Nova Scotia, Canada - interviewees discussed how public participation was not made a mandatory requirement as a part of the MCCAP policy mandate. There was a general perception among most interviewees that conducting public consultation in advance of first developing an internal, high-level assessment of climate change risks, hazards and impacts to municipalities' could have created elevated public expectations or appeared alarmist in the eyes of community members. A 'medium' level of public participation was also described in the focus groups and verified in the online survey.

Constraints on public participation also related time availability and low levels of public interest; as well, concerns about the quality and utility of information gained through public engagement were identified. One consultant discussed the utility of community vulnerability mapping as a means of base lining impact information for future monitoring and planning, while also raising public awareness of climate change impacts at the local scale. Several interviewees mentioned the educational value of the completed MCCAP for raising public knowledge and awareness of local climate change risks.

These findings suggest multi-level adaptation governance requirements and place-specific social contexts of adaptation planning informed the degree and manner in which municipalities' included public participation in their adaptation planning processes. Municipality A had a low level of the public in the preparation process due to resource availability, time constraints, the fact that it was not required and 'values' judgments made by the planner in charge to not raise public expectations without first having good information based on internal assessment, in collaboration with experts. Municipality B perceived that public consultation was important; however more as an educational-process than as an information-gathering forum. This contrasts with the consultant who described community mapping as a viable means for conducting adaptation planning and strategy developments using a 'crowd-sourced' approach. In another case, Municipality C internally included the public on the MCCAP committee and looked to the future as the appropriate venue for public comments and inclusion in the operationalizing adaptation actions through strategic land use planning review processes. In each instance of an adaptation planning public participation process, there are merits and drawbacks.

Qualitatively material differences in adaptation public processes and planning approaches are a subject deserving of greater conceptual inquisition in future adaptation case studies.

6.4 Adaptation integration: Barriers and constraints

The online survey indicated that the top three barriers to municipal climate adaptation integration were lack of funding from higher levels of government for the implementation of MCCAP priorities (17/19); competing priorities for scarce infrastructure dollars problematizing the advancement of municipal adaptation priorities (17/19); and the common stakeholder perception that lack of human resources and/or funding for capacity building were the top two barriers to overcome in bridging the gap between MCCAP preparation and implementation (17/19). Further barriers identified included a perception that there is a need for reliable funding and staff resources to enable knowledge and provide the capacities required for making progress on MCCAP implementation and risk reduction (16/19, with 13/16 indicating this was a medium to high priority).

A lack of dedicated staff time was perceived as a hindrance to action on MCCAP implementation priorities and was identified by 16/19 respondents as a barrier to adaptation integration. The need for more technical information including modeling, scenarios and mapping to local scales was identified as a barrier by 15/19, with 15/15 identifying this as a priority of medium to high priority. Another barrier identified was the need for information on ‘best practices’, frameworks, case studies (including tools and processes) for adaptation policy and planning, including innovative financing options and the related need for knowledge of methods for monitoring climate change impacts and assessing adaptation effectiveness at local scale. Both of these barriers were identified by 15/19 respondents as important social barriers to adaptation integration at the local scale.

6.4.1 Barriers: municipal analysis

6.4.1.1 Municipality A

A lack of public demand to generate political will for adaptation were discussed

as mutually reinforcing social impact factors constraining adaptation integration in this case. The land use planner discussed a lack of municipal resources, raising the municipal need for capacity support from higher levels of government in order to overcome adaptation barriers, including those related to measurements of adaptation ‘success’. Making land-use changes and explaining climate uncertainties about the need for action to external private property owners posed difficulties for this municipality’s adaptation planning and policy integration. Developing greater municipal organizational awareness of the significance of the adaptation planning was perceived to be an important social factor influencing municipal political direction. Political support was viewed as an important dimension of tangibly implementing adaptation priorities related to changes in maintenance protocols and the need for infrastructure upgrading to address potential flood risks. Adaptation issues facing this municipality were more of a longer-term adaptation and climate risk concern, given the place-based vulnerability context.

6.4.1.2 Municipality B

The sustainability planner pinpointed that moving from adaptation planning priorities to adaptation policy integration faced the major hurdle of fiscal resource allocations and that this was the top barrier for municipalities’ adaptation capacities. Since adaptation interventions could be cost-prohibitive for municipalities, there was a perceived need for fiscal resources. The sustainability planner discussed how making linkages between MCCAP/sustainability planning and municipal capital investment processes would require a ‘financial decision making overhaul’ but be a ‘major integrating factor’; otherwise there was a perception that ‘plans sit on the shelf’.

There was discussion of the broader need for federal leadership in setting the national policy agenda and resource distribution regimes to address climate change at provincial and regional scales, in collaboration with municipalities. These were seen as important social aspects of adaptation policy integration at the municipal scale in this case and more broadly.

6.4.1.3 Municipality C

Lack of public support for adaptation priorities, lack of funding in austere fiscal environment of small municipalities were perceived as social factors impacting the lack of political leadership; barriers that synergistically undermined the municipalities' abilities for adaptation integration. Muted local public demand and the expense of modifying existing infrastructure were discussed as obstacles to adaptation planning and policy integration. Achieving local political unanimity to act on adaptation priorities also was mentioned as a barrier. The broader lack of federal leadership on climate change or support for municipalities' adaptation planning implementation was discussed and highlighted as a hindrance to adaptation planning and policy integration at the municipal scale.

6.4.2 Barriers: non-municipal analysis

The provincial policy-maker discussed how the financial costs of adaptation posed a significant barrier for municipal adaptation. This barrier was perceived to provide an opportunity for identifying specific capacity and collaboration gaps and opportunities in common across municipalities through MCCAP process. The policy-maker expressed the opinion that this type of analysis could inform provincial adaptation policy making and regional scale responses and the possible best planning practices for effective coastal hazard mitigation and adaptation in municipalities.

The NGO representative interviewed highlighted that there was currently no provincial funding for adaptation implementation. The respondent held the perception that the high costs associated with adaptation were compounded further by the lack of human resources and fiscal capacities at the municipal scale, and these impactful social factors hindered adaptation integration. The respondent shared that scarce resources and competing priorities necessitated ongoing education and proactive approaches for integrating sustainability and long-term planning approaches at the municipal scale. The interviewee noted further that the lack of municipal capacity/skills to 'decipher and make relevant' climate change information hindered the normalization of climate change in decision-making. A desire for stronger federal leadership in setting the policy direction

on adaptation to climate hazards and mitigation of greenhouse gases was also elucidated.

Interviews with the two consultants further highlighted how institutional barriers prevented the dispersion of new information (e.g., mapping data) while the skills to make use of information hindered MCCAP integration into municipal planning processes. Corroborating municipal perspectives also articulated a specific desire for provincial assistance with access to mapping technology. Specifically, LiDAR mapping was viewed as a means of supporting ‘adaptive’ institution building across levels of government by providing better mapping information to inform municipal land use strategies to address climate risks.

One consultant discussed the lack of municipal ‘corporate memory’ and the need for enabling the current and future documentation of existing local knowledge of hazards and mitigation responses as a contributive social factor to accrete the scientific basis for further adaptation policy and planning developments. The shared perspective reported by both consultants was that overcoming barriers required municipalities’ to have the necessary skills to make use climate change information, which related to barriers associated with limited financial and human resources. In the succinct words of one consultant: ‘I think for municipalities, it’s having the money and staff to do implementation’.

6.4.3 Discussion: barriers to adaptation integration

Corfee Morlot et al., (2009) discuss how municipal governance barriers in the multi-level climate change governance contexts can relate to: i) institutional blockages at the local scale due to insufficient capacity and experience; ii) lack of funding; iii) lack of devolved authority; iv) inadequate support from central governments, as well as; v) lack of coherence and policy alignment in higher governments’ policy and regulatory frameworks. These five barriers can significantly undermine the success of local or regional climate policy implementation.

All three municipalities and multiple non-municipal interviewees identified multi-level governance barriers including: i) lack of resources; ii) an austere provincial and

municipal fiscal environment; and, iii) a need for municipal support from higher levels of government as factors impacting the potential for municipal adaptation integration.

Institutional differences in staff roles and responsibilities and organizational values driving political decision-making were discussed as barriers impacting adaptation integration across cases. Notable social constraints discussed as influences on adaptation integration included: the need for sustainable funding from higher levels of government to support capacity building, including staff and better access to information. In the interviews, a strong desire for leadership from the provincial and federal government on matters of clarifying policy jurisdictions and providing access to information and resources were widely perceived as impactful social factors contributive to facilitating adaptation integration at the local scale. The evidence suggests municipalities' were constrained in their access to provincial departmental knowledge resources and this institutional fragmentation diminished municipal stakeholders capacities to adequately assess long-term, complex risks associated with climate change (e.g., groundwater, coastal erosion).

Two out three municipalities also discussed the mutual dependence of public demand and political will as constraining factors affecting adaptation policy integration. The CAO discussed the costs of modifying existing infrastructure and the Mayor discussed how achieving political unanimity to act of adaptation priorities was a constraint to adaptation integration. The land use planner identified the issues of measuring adaptation 'success' as a barrier, while the sustainability planner discussed difficulties associated with integrating adaptation-planning priorities into municipal fiscal resource allocations.

Several respondents identified the need for federal political leadership to support provincial governments' and municipalities with climate change adaptation. A lack of national leadership was perceived as a constraining factor impacting the likelihood or success of climate change adaptation integration at the local scale in municipalities. This finding directs attention to the broader socio-political importance of the national multi-level governance context and the apparent need for cross-scalar political leadership,

policy-making and coordination in order to achieve common national climate change policy goals at lower scales of governments, including municipalities.

At provincial and municipal scales in Canada – in the decadal federal climate leadership vacuum under Harper – the lower orders of government (e.g., Nova Scotia MCCAP) advanced adaptation governance models that provided learning opportunities for organizational and multi-level governance institutional innovation and reform more attenuated to the empirical realities of municipal climate change adaptation planning implementation. In the MCCAP case, Nova Scotia's vulnerable municipalities were provincially tasked with planning for adaptation, in a broader social context where national climate leadership was cynically perceived as devoid. This evidence suggests that cross-scalar aspects of national political leadership may be an impactful social factor affecting effective multi-level climate change adaptation governance in municipalities, and this is deserving of greater scholarly investigation.

These illustrative findings indicate an array of social impact factors acting as impediments and obstacles preventing effective facilitation of the integration of municipal climate change adaptation in a Canadian example of a provincial-municipal multi-level governance context. Constraints related to staff, time availability and low levels of public interest, as well the quality and utility of information gained through public engagement were identified. While MCCAP integration was reported to be occurring informally or formally by the majority of survey participants, a lack of human resource capacity and funding, as well as competing priorities in austere fiscal environments, a lack of federal, provincial and local political leadership, and a lack of staff time, were identified as important social constraints hindering municipal adaptation integration.

6.5 Adaptation integration: Opportunities

The top opportunities identified for adaptation integration in Nova Scotian municipalities in the online survey included: i) integrating climate change considerations into municipal planning processes (work plans, capital plans and projects) (19/19); and, ii) developing and coordinating integrated regional land-use approaches for advancing

long-term adaptation and emergency planning through regional emergency measures organizations and/or regional ‘champions’ (18/19).

17/19 mutually agreed that municipal collaboration and/or clarification of inter-governmental legal responsibilities was required in order to facilitate better policy, planning and implementation of adaptation and emergency preparedness plans and strategies at regional and provincial scales. 17/19 shared the perception that capacity-building funding for staff and resources was required for cost-effectively progressing with the implementation of MCCAP priorities, including through funding allocation provisions to allow for hiring a municipal adaptation and/or sustainability planning specialist as an eligible capacity-building category in the gas tax funding agreement. 16/19 respondents also agreed that procuring provincial administered climate change related data was required for better enabling municipal adaptation planning and implementation priorities (e.g. LiDAR mapping, energy usage). These were tangible policy opportunities identified for municipal adaptation integration and multi-level governance cross-institutional collaboration to support adaptive capacities at the municipal scale.

6.5.1 Opportunities: municipal analysis

6.5.1.1 Municipality A

The land-use planner discussed lobbying higher levels of government to procure additional funding to act on climate change risks. There was a perceived need for province to provide municipalities with tools, information and education based on a synthesis of MCCAPs. The land use planner also perceived wider opportunities for stakeholder collaboration and public engagement on planning and policy issues raised by the MCCAP process, respecting the mitigation of regional overland tidal flood risks and other contextual climate vulnerabilities.

6.5.1.2 Municipality B

The sustainability planner discussed the opportunity for clarifying cross-jurisdictional policy responsibilities for hazard mitigation (e.g., multi-level adaptation

governance of coastal areas, vulnerable transportation and infrastructure) as a key adaptation governance opportunity. Developing monitoring and annual reporting protocols on MCCAP priorities and implementations to council was also identified as an opportunity for policy accountability and MCCAP implementation. MCCAP integration was discussed as occurring through incremental changes to organizational structures and policy-changes (e.g., land-use controls in municipal planning strategy; secondary storm-water/drainage master plans) to inform ‘adaptive’ infrastructure and proactive climate adaptation planning decisions.

The councillor discussed how the sustainability planner provided a ‘daily voice’ (capacity-knowledge resource) for adaptation planning and policy integration, encouraging that there should be broader potential for supporting the creation of municipal sustainability planners’ as a valuable capacity resource for constrained municipalities. Because of the added staff capacity in Municipality B, the councillor discussed how, ‘...the community sustainability plan solidly has found its way into day-to-day operations and decision making. The MCCAP will take some time to get to that point as well, but we can definitely see it starting to work its way in’.

The evidence suggests that added staff capacity in the case of the Municipality B facilitated greater potential for adaptation integration. The socially dynamic, inter-departmental role played by the sustainability planner in this case contributed a material difference in the capacity for adaptation integration and environmental considerations at the tangible local scale of planning, infrastructure and development policies and procedures. By all appearances, the added staff capacity for sustainability planning was contributive to the likelihood of MCCAP implementation and adaptation integration in this case. In comparison to the other two municipalities, Municipality B had a material staffing difference and added capacity for making operable ‘sustainability’ related policy integration into municipal operations on a sustained and daily basis, as a paid, full-time employee of a municipal government organization with specific job responsibilities related to advancing municipal sustainability and climate change actions.

Academic collaboration and a desire for provincial ‘follow-through’ and leadership on MCCAP implementation (e.g., Province wide LiDAR mapping and flood studies) were discussed as opportunities by several interviewees. Conducting internal and public education on climate change to broaden wider knowledge and understanding of importance of adaptation issues was also perceived to present public and stakeholder engagement opportunities for adaptation integration in the municipal social landscape to contribute to the generation of public knowledge and support to, in turn, reciprocally generate political will for adaptation actions at the local scale.

6.5.1.3 Municipality C

Both the CAO and the Mayor discussed the need for matched funding from higher levels of government for the implementation of adaptation priorities related to vulnerable infrastructure in the coastal zone. There was a desire for dedicated funding programs for adaptation measures from higher levels of government, including programs that encouraged staff capacities for supporting the integration of adaptation priorities into municipal budgeting processes. The CAO discussed how informal integration was occurring on an ad-hoc basis, providing the example of how in absence of funding or capacity for infrastructure renewal, the municipal sewage operator had made incremental changes to address issues with salt-water intrusion affecting wastewater infrastructure.

The CAO described how adaptation integration in political decision-making processes was ‘the biggest challenge’ while the Mayor was not able to provide a concise articulation about how adaptation integration would occur, given that the municipality was not yet at a point of acting on adaptation implementation. The CAO interviewed discussed opportunities for staff to integrate adaptation priorities into budgeting processes for Council’s consideration, while the Mayor discussed integrating the MCCAP priorities into future land-use planning consultations and strategic public consultation processes.

There was a mutual desire by this municipality’s staff and political leadership that higher levels of government should support local capabilities to address contextual adaptation issues sustainably, notably including broader integration of climate change adaptation

considerations (e.g., sea-level rise, storms and coastal flooding impacts), into the municipal planning strategy, bylaws and policies to reduce vulnerability to hazards.

6.5.2 Opportunities: non-municipal analysis

The provincial policy-maker discussed the need for the province and municipalities to work in partnership on municipal implementation and adaptation interventions. According the respondent, this required ongoing collaborations across levels and departments of government on issues of coastal zone planning and management, including the clarification of jurisdictional roles and responsibilities. It was acknowledged that amendments to the Municipal Government Act might be required to address cross-institutional planning and policy-making constraints related to improving the opacity of policy jurisdictions on matters of climate risk reduction. The provincial policy maker expressed an opinion that future adaptation implementation provided an opportunity for replicating successful examples of policy and planning practices from other jurisdictions.

At the municipal scale, the NGO representative discussed the need for staff champions and dedicated implementation staff in order to ‘keep [adaptation] a priority and make it a budget item’. The respondent highlighted how municipal sustainability planner positions might present an opportunity for this to happen. There was a perceived need for provincial leadership, support and funding to realize MCCAP implementation through capacity building. This included the opportunity for developing long-term provincial strategic coastal policy through regional approaches to adaptation planning to address cross-jurisdiction issues of coastal climate hazards and risks collaboratively in Nova Scotia municipalities’.

Both consultants interviewed commented about the need for provincial responsibility and leadership to address contextual risk issues associated with municipal coastal development planning policy-making guidelines. This included the provincial need for better inter-departmental collaboration at the provincial government scale to ensure better policy congruence conducive to supporting municipal counterparts tasked with development approval processes and jurisdiction over land use strategies. Consultants

perceived opportunities for building on existing successes of policy frameworks like MCCAP. This included opportunities for municipal staff capacity building (e.g., tools, knowledge, community-based mapping, decision making) contributive to developing coherent coastal planning and coastal setback policy developments for all Nova Scotia municipalities.

Consultant B perceived that policy frameworks to facilitate local actions included celebrating local successes and building on existing initiatives. For example higher levels of government could support provincial and regional adaptation capacity-building forums. Supportive municipal CAOs that set adaptation policy directions for staff and council were also recognized as a social impact factor contributive to adaptation integration.

National climate change policy approaches and federal funding support for capacity building, information, research and science to inform provincial and municipal adaptation was widely perceived to be contextually important to the likelihood of success for municipal adaptation capacity-building and policy integration. Federal leadership on GHG mitigation policy and sustainable urban development were also perceived by Consultant B as a required part of a coherent adaptation governance framework in the broader multi-level governance context.

Consultant A shared the perception that the province had the responsibility to find a way to act on the MCCAPs implementation in order to sustain and enable municipal adaptation policy development and to facilitate stakeholder collaborations that could continue to raise adaptive capacity. This included the laundry list of: i) addressing the need for increased provincial inter-departmental collaboration; ii) supporting and developing council and staff champions for adaptation; iii) utilizing contextually important social factors involved with infrastructure and emergency management planning to advance adaptation policy agendas; iv) providing federal financial assistance for municipal adaptation to flexibly address local risk contexts and adaptation needs; v) developing provincial land-use policy guidelines to apply to all municipalities to support coastal adaptation policy; vi) providing regulatory clarifications regarding the roles and

responsibilities of the provincial emergency management office and its municipal counterparts in planning and responding to environmental disasters and emergencies, as a means of ensuring policy congruence for coordinated disaster response.

6.5.3 Discussion: adaptation integration opportunities

The survey results and interview findings related to opportunities for adaptation policy integration indicated there are substantial opportunities for improving multi-level governance mechanisms to support municipal climate change adaptation stakeholders. Integrating adaptation policy is an ideal that, while laudable, appears to be difficult to implement in practice (Wyborn and Dovers, 2014; IPCC, 2014; Pasquini et al., 2013).

While Nova Scotia's MCCAP process offers a pioneering example of adaptation planning and policy making, it also exhibits symptomatic multi-level governance barriers and issues of institutional fragmentation and conflicting policy power, both horizontally and vertically. However, many of the barriers and opportunities for improving the integration of adaptation through municipal planning and policy making relate to addressing impactful social factors like lack of staff and funding. Lack of provincial and federal government leadership to fund and capacitate the municipal skills and resources was widely perceived as a critical social factor hindering the potential for integration and implementation of climate change adaptation actions at the municipal level in Nova Scotia. However, the MCCAP evidence suggests that municipalities widely benefited from the opportunity to initially engage in adaptation planning and capacity-building to begin the complex process of integrating adaptation strategies into municipal practices. The MCCAP policy mandate provided a rich opportunity for widespread climate change information production at the local scale. The adaptation planning process contributed to commonly raising municipalities' adaptive capacities by identifying and prioritizing climate change risks, while initiating and raising the capacity for municipal adaptation to be materially realized in local policy making activities through a mandated strategic planning process.

Tables Ten and Eleven illustrate the variance in perspectives of municipalities related to the social benefits and opportunities created by the MCCAP process.

	Municipality A	Municipality B	Municipality C
Benefits of MCCAP Process	Improved opportunities for municipal preparedness to address major climate change risks (marsh flooding)	Preliminary information gathering and awareness raising; base-lining information and putting climate change ‘on the table’; added new questions and raised need for operational changes and policy and planning discussion topics in procuring/developing and deciding on new water/wastewater infrastructure	Improved information for community preparedness / emergency management to minimize storm damages through adaptation planning and infrastructure investment (e.g. vulnerable sewage lift stations); stakeholder education of local climate risks beneficial outcome of MCCAP process
		Emergency management coordinator <i>(Involved in Municipality 2 and 3 MCCAP processes)</i>	MCCAP provided collaborative and motivating opportunities to ‘expand the team’ in dealing with regional scale climate risks; MCCAP motivated staff

Table 10: Across-case evidence of the social benefits of the MCCAP process (municipal perspective)

NGO representative	Awareness raising for stakeholders; institutionalizing adaptation in municipal governments; raising recognition of climate change through public awareness
Provincial policy-maker	Increasing stakeholder and public awareness of climate hazards and flooding and ensuring operational capacities to respond are in place are beneficial social examples of adaptation measures taken by municipalities’ post-MCCAP. Confirmation of utility of MCCAP: predictive modeling and preventative measures were used by municipalities’ to anticipate and adapt to storm surge and high tide impacts associated with coastal storms on municipal infrastructure (lift stations, waste water systems, public works and maintenance operations) by taking preventative risk reduction actions.
Consultant 1	MCCAP was more successful in some municipalities than others; good awareness raising exercise; benefited long-term planning discussions and outlooks and perspectives for current infrastructure and future development; influenced ‘subconscious thinking process’ - positive for municipal implementation and operations integration ‘over time’; proactive emergency planning and collaborative stakeholder engagement; importance of regional collaboration on shared adaptation planning issues (e.g. causeways; ferries; coastal infrastructure)
Consultant 2	Integrating HRVA into MCCAP process; raising municipal planning capacity to incorporate sea-level rise information into land-use strategies; potential for municipal storm surge monitoring to be integrated into federal environmental emergency response policy development: feeding local monitoring and climate change baseline information up to provide evidence of the provincial and national need for updating floodplain mapping to inform adaptive municipal land-use planning

Table 11: Across-case evidence of the social benefits of the MCCAP process (non-municipal perspective)

The benefits of undertaking the MCCAP process identified by interviewees largely pertained to increasing municipal knowledge, awareness and understanding of climate change risks and opportunities for collaboratively planning and acting to reduce the risks associated with climate change impacts and hazards occurring at the local and regional scales. For example, the emergency management coordinator highlighted how adaptation integration at the municipal scale required staff leadership from the CAO to integrate climate change adaptation into daily operations. However, a lack of funding for implementation deterred from sustaining efforts for adaptation implementation and staff motivation. The respondent further highlighted the need for access to funding and expertise. Provincial policy leadership to encourage local adaptation policy customization based on municipal context and needs was perceived to offer advantageous, short-term opportunities to build longer term local sustainability.

Integrating flood elevation planning into land-use policy and planning and addressing opportunities for improved regional collaboration on emergency planning were beneficial opportunities for continued adaptation policy development identified by both interviewees and survey participants in Nova Scotia. The process of completing the MCCAP was reported to have increased municipal knowledge, awareness and understanding of climate change risks and opportunities for collaboratively planning for climate change impacts and hazards occurring at the local and regional scales.

6.5.3.1 Advancing adaptation integration through multi-level adaptation governance and opportunities for inter-governmental institutional capacity building

To be robust and durable, adaptation principles and objectives can be integrated into overarching day-to-day planning and governance decision-making processes (Bouwer and Aerts, 2006). Integrating climate change adaptation can occur through municipalities' changing staff job descriptions and performance evaluations (Burch, 2010), or through multi-level institutional funding mechanisms that facilitate adaptation integration into existing municipal policies and programs (Aall, 2012; Aall et al., 2007). These multi-level aspects of adaptation integration provide examples of social impact factors that can affect municipal capacities for adaptation policy making. Advancing

cross-scalar governance to support and integrate sustainable municipal decision-making practices is a social impact factor of key research interest related to inter-governmental and inter-departmental collaborations. In this regard, effectively aiming towards efficient, effective implementation of municipal adaptation planning priorities requires consideration of these types of social factors impacting municipalities' capacity for adaptation in multi-level governance contexts (Penney and Wieditz, 2007).

Clear opportunities related to municipal adaptive capacity-building support in the MCCAP study included: i) providing funding, resources and technical expertise through multi-level governance mechanisms in order to; ii) facilitate integrated risk reduction in strategic coastal zone land-use planning and policy making, particularly at regional scales, and through municipal emergency preparedness planning.

Two out of the three municipalities compared in this study discussed opportunities for improving intergovernmental funding, cost sharing and developing programs on climate change adaptation as a means of capacitating municipal adaptation integration. Gaining access to reliable capacity-building funding for staffing and resources were all identified as important factors for enabling the integration of adaptation priorities at the local scale to make progress on MCCAP implementation and integrated risk reduction.

Two out of three municipalities identified an opportunity for adaptive capacity building to occur through multi-level governance leadership to facilitate aerial digital elevation and flood plain mapping studies, to better inform municipalities in making land-use planning and infrastructure strategies and decisions. Procuring climate change related data required for planning priorities, and having further opportunities for increasing required knowledge for adaptation policy and planning were perceived to be important.

Two out of three municipalities also discussed opportunities for furthering stakeholder collaboration and public engagement to broaden knowledge, interest and action on climate change adaptation issues. Corfee Morlot et al., (2009) discuss how regional approaches to climate action can leverage collaborative scale to achieve greater structural changes than realizable at the individual municipal scale. Leveraging technical and financial capacity and know-how through regional scale strategic planning and policy

development can efficiently contribute to coordinated and collaborative achievement of climate targets for mitigation and adaptation, greater than what may be realizable at the individual scale.

Clarifications of inter-governmental jurisdictional and regulatory policy making responsibilities were identified as important collaborative opportunities for enabling adaptation integration. This was viewed as an important social dimension for facilitating coherent and congruent adaptation policy, planning and the implementation of climate change adaptation and emergency preparedness strategies at regional and provincial scales.

Sustaining municipal adaptation policy development and “mainstreaming” adaptation priorities requires integrating adaptation into municipal processes. In the literature, the creation of designated sustainability and climate change planning staff positions (Baynham and Stevens, 2014; Krause, 2012; Measham et al., 2011) has been utilized and observed to raise municipal adaptive capacities in other cases. The findings of this research related to municipal adaptation barriers suggests that institutionalizing climate change adaptation as a social lens in the context of multi-level adaptation governance policy, planning and decision-making may enhance policy coherence across levels, by minimizing duplication to ensure policies are not working at cross-purposes (Kok and de Coninck, 2007).

The creation of ‘sustainability planner’ positions for municipalities appears to present a key social factor and institutional adaptive capacity building opportunity for capacitating adaptation integration at the municipal scale. Job descriptions could include: i) adaptation plan implementation via, ii) priorities monitoring and reporting; iii) facilitating inter-governmental collaboration; iv) acting as a ‘knowledge resource’ and ‘daily voice’ for adaptation mainstreaming into planning, budgeting, and operations; and, v) serving as a capacity-building resource and liaison point person for working with regional stakeholders to raise public awareness, interest, knowledge and engagement in climate change adaptation issues.

Interviewees discussed how integrating adaptation into municipal planning occurs as an incremental process of organizational change involving awareness building and augmenting the planning and policy making processes and decision making actions of municipal staff and council to incorporate climate change considerations, incrementally and sustainably. Sustaining municipal adaptation policy development and mainstreaming or integrating adaptation priorities into municipal processes through the creation of ‘sustainability planner’ employment positions for municipalities appears to present a key multi-level governance opportunity for capacitating adaptation integration.

This research substantiates it is possible and advisable for climate change adaptation to be integrated into official plans and policies at the municipal scale (e.g., sustainability and adaptation vision statements, strategic plans, guidelines, strategies, by-laws, regulations, and infrastructure asset management plans). This incremental adaptive, adjustment process may offer many social benefits and cost-effective considerations for achieving multi-level policy coherence contributive to achieving longer-term sustainability goals and objectives. Comprehensive climate change risk reductions, in local, provincial and national contexts, necessitate normalizing planning for reducing greenhouse gases and adapting to climate impacts in Canadian municipalities using multi-level governance frameworks.

These empirical findings raise conceptual attention to how access to resources is a key social factor impacting and constraining municipal adaptation planning and policy integration in the multi-level adaptation governance context of Nova Scotia, Canada. Based on research findings, Figure Seven provides a conceptual illustration of the social landscape of impactful factors affecting stakeholder engagement and adaptation integration in the Nova Scotia MCCAP process.

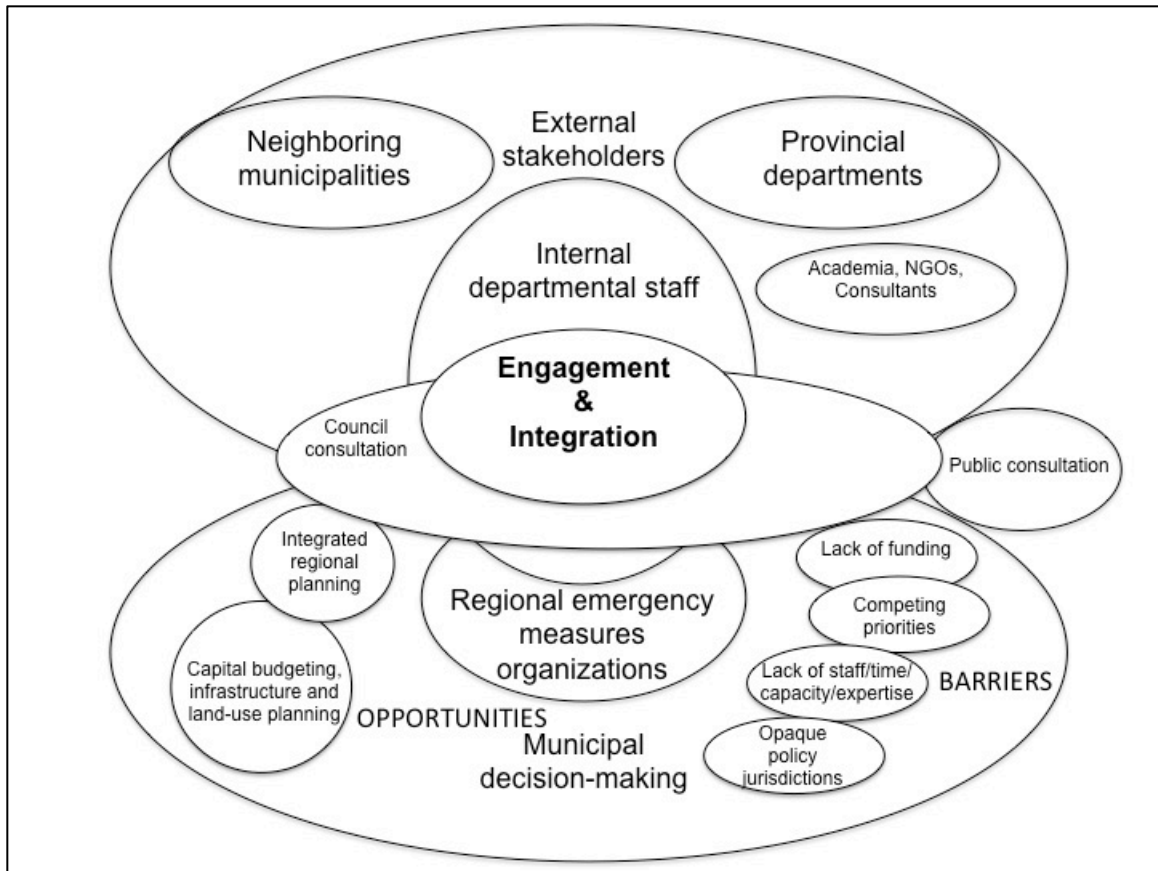


Figure 7: MCCAP stakeholder engagement and adaptation policy integration barriers and opportunities

Social factors impacting municipal adaptation planning in Nova Scotia municipalities reveal important roles and responsibilities for actors within multi-level adaptation governance frameworks. Key vertical, horizontal multi-level and complex social aspects of a diverse social landscapes and place-based issues of multi-level policy power, agenda-setting, resource distribution and jurisdictional authority are highlighted in the governance coordination issues exemplified in the MCCAP multi-level adaptation governance case from Nova Scotia, Canada (Horak, 2012). The final section of this chapter addresses the policy theme of political support for adaptation planning development and policy integration.

6.6 Adaptation integration and political support: Was political support important for adaptation policy development?

There was unanimous opinion in the survey (19/19) that political leadership and support is important for adaptation integration for three key reasons:

1. Inter-departmental staff motivation and collaboration on MCCAP priorities implementation (ex. land-use planning strategic reviews, integrating MCCAP priorities into infrastructure and asset management) requires and relies on political leadership and support for adaptation policy priorities.
2. Political leadership and support is important for collaboration with staff on implementing adaptation priorities, to ensure that capital infrastructure planning and annual budgeting processes include climate change adaptation priorities and considerations.
3. Political leadership and support is important to support public education and awareness-raising initiatives to reduce climate risks and increase resilience to climate impacts in municipalities

There was also near unanimous agreement (18/19) that political leadership and support is an important aspect of inter-municipal collaboration to address adaptation priorities through regional emergency measures organizations by regionally sharing responsibilities on integrated approaches to climate risk reduction through infrastructure and land-use planning collaboration and strategies.

6.6.1 Political support: non-municipal analysis

To further probe the governance influences on local adaptation approaches, in the interview protocol were a series of questions prompting participants to reflect on the underlying social factors that affected the process of preparing the MCCAP, and the broader nature of governance as a key determinant of a successful adaptation process. To obliquely probe the potentially volatile social issues associated with adaptation politics, two appropriate quote are: i) ‘The nature of governance is thought be a major determinant of the success of an adaptation process to climate extremes’ (Finan and Nelson, 2009); and, ii) Adaptation governance can be conceived to be ‘the set of decisions, actors, processes, institutional structures and mechanisms, including the division of authority and underlying norms, involved in determining a course of action’ (Moser, 2009)

Within this context, interviewees were encouraged to discuss how progress towards the implementation of the MCCAP plans related to the social aspects of adaptive capacity (e.g., Smit and Wandel, 2006; See operational definitions). Six of ten interviewees discussed staff/political knowledge and skills to make use of climate change information as the most important social factor for adaptation planning and policy integration. Interviewees discussed ‘staff champions’ employed as CAOs (3/10) dedicated sustainability planners (3/10), senior planners, infrastructure managers or emergency management coordinators (1/10) as important stakeholders for facilitating adaptation integration. As well, three interviewees discussed the provincial government as an important authority for facilitating the implementation of adaptation planning priorities.

The provincial policy-maker identified all adaptive capacity levers as important within the contextual dependence of the individual needs of municipalities. The interviewee further discussed how through a combination of observable changes and increasing media exposure, climate change discourse had become ‘normalized as a social backdrop’ which, in turn, had increased the social acceptability for having climate change adaptation policy discussions with municipal politicians. This was viewed as contributive to generating municipal stakeholders ‘buy in’ to the MCCAP process.

The NGO interviewee highlighted that while all the adaptive capacity levers were important, the skills to make use of information was particularly important, citing that the ‘...challenge is to have capacity within municipalities to decipher information and make it relevant to each municipalities’ distinct context’ (NGO representative: September 12 2014). The interviewee also identified that policy architecture was a ‘big one’ for the normalization of climate change decision-making and planning implementation support (e.g. funding, capacity, expertise). The NGO interviewee discussed how social norms and expectations (e.g., gas tax reporting requirements) played an important role invoking adaptation policy support among municipal politicians. The respondent also discussed how political will prior to the MCCAP related to how autonomous examples of proven adaptation measures ‘normalized’ in the decision-making processes of one municipality, served as a positive social impact factor on neighboring municipalities’ council receptivity to adopt similar measures (e.g., ‘copycat’ pattern of autonomous climate

policy dispersion discussed by Bassett and Shandas, 2010). Academic research and capacity-building projects were also discussed by the NGO interviewee as social impact factors contributing to the normalization of a larger ‘culture of sustainability and climate change adaptation’ in many Nova Scotian municipalities.

The emergency management coordinator noted the skills to make use of climate information included staff framing dexterity and ‘positive-spin’ techniques for building municipal political support for adaptation, such as using an ‘adaptation to climate change’ frame versus focusing on ‘negative’ framings such as lack of resources or vulnerability to climate change impacts. The interviewee identified positive policy direction alignments between the MCCAP process and how ‘organic things and farmers markets’ presented congruent opportunities for building municipal support for resilient and transformative changes to deal with climate change within larger contexts (e.g. imported food insecurity, California drought) while gaining local, and potentially transformational, benefits (e.g. greater food security; local social, cultural, economic and environmental benefits).

Consultant B discussed how the MCCAP process provided an opportunity for shifting municipalities’ adaptation planning conversations from environmental vulnerability towards addressing more systemic socio-economic constraints and the political opportunities for improving adaptive capacity and determining adaptation priorities:

The MCCAP process, ultimately if done well, should have made the local government realize that there is this concept called adaptive capacity and contemporary local governments have no option really other than to focus on it... To me that’s the next step (Consultant 2: September 26 2014).

Consultant A discussed how connecting climate change risks and hazards to local scale impacts that ‘affect stakeholders personally’ but also as issues of collective interest (e.g. insurance premiums, shared infrastructure vulnerability), acted as an important influence on the ‘formal and informal values’ that impact political decision-making processes.

6.6.2 Political support: municipal analysis

Municipal interviewees shared perspectives regarding the challenges and the importance of staff leadership and political direction in facilitating organizational

changes to integrate climate change adaptation into municipal day-to-day practices. This included broader considerations of provincial and national socio-political contexts.

6.6.2.1 Municipality A: The short-sighted political culture of 'economy first'

The land use planner in Municipality A discussed how organizational awareness and political direction were required for adaptation policy integration. However, political direction was dependent on public demand, thus the political will for adaptation as a policy priority was low on the municipal agenda. Of more political concern were the immediate maintenance and infrastructure costs associated with upgrading existing infrastructure for flood risks. The land use planner identified how lack of time, resources and a municipal political culture focused on addressing shorter-term economic issues undermined broader, long-term adaptation policy-making success.

The interviewee commented:

Our population and lack of economic development and lack of immigration to replace our aging population is not painting a very rosy picture... I think that the economy tends to trump longer term, less tangible issues of climate vulnerability... (Municipal land-use planner: September 15 2014).

The interviewee discussed the tendency for social values, norms and expectations to be affected by broader socio-economic and political contexts, serving also as social factors impacting and influencing the generation of local political will and policy-making priorities in this municipality. Political leadership, provincial leadership and outside collaborations were perceived by the interviewee to be important social factors for integrating adaptation, including the need for having access to technology to better understand climate change risks and make informed planning decisions.

In this social context of municipal adaptation planning, the interviewee discussed opportunities for learning from other municipalities' approaches to adaptation, as well as drawing on past professional experiences with climate change risk management (e.g. planning employment in the Netherlands) to inform his approach to adaptation policy-making. Taken in context, these personal attributes of the interviewee may have had an influence on local adaptation decision-making processes.

6.6.2.2 Municipality B: Reciprocities of staff capacity and political support

The sustainability planner in the second case idealistically discussed the need for cultivating political support to improve the likelihood and durability of municipal investments in adaptation processes and intervention actions. The interviewee discussed the holistic need for a ‘financial decision-making overhaul’ as linking capital investments to climate actions was perceived to be a ‘major integrating factor’ of the policy-making success of adaptation interventions. The interviewee discussed how sustainability and climate change screening mechanisms and indicators could be introduced into municipal financial decision-making processes to prevent ‘plans sitting on the shelf’ and in order realize tangible actions through existing processes. In the absence of this transformative integration model for generating political support through internal mechanisms, MCCAP integration was more pragmatically perceived to empirically occur as a process of incremental changes to organizational structures (e.g. land-use controls in municipal planning strategy; secondary storm-water/drainage master plans) to inform infrastructure and planning decisions, as well as through the broader cultivation of values and norms that were supportive of these changes in the municipality’s operational culture.

Shepherding these processes was perceived to be a functional responsibility of municipal government, as exemplified in this municipalities’ autonomous decision to allocate and fund the sustainability planner’s proposal for conducting a \$50,000 integrated coastal/river flood scenario model, as a duly diligent part of conducting the municipalities MCCAP process. Existing policy integrations and benefits achieved via the materially significant added staff capacity of the sustainability planner provide a unique qualitative indicator of a potent social variable influencing municipal adaptation policy making, agenda setting, problem framing, option formulation, risk prioritization, stakeholder engagement and public participation processes in materially significant capacities for change-making at the local municipal scale. This is a social impact factor deserving of greater analysis in future comparative adaptation case studies.

The councilor interviewed highlighted the importance of the skills to make use of climate change risk information in enabling climate change risk decision-making through policy

infrastructure. She commenting from the political vantage point about the ‘confusing report’ or attending meetings that required interpretation by the sustainability planner to understand: ‘what did that mean?’

The sustainability planner discussed how cultural frameworks and the ‘value’ placed on climate change as an issue in political decision-making was an important aspect informing municipal adaptation governance approaches. The sustainability planner commented:

I would say that that’s probably the most key... adequate policy infrastructure for enabling climate change risk decision-making. “I’m being told that I have to make climate change related decisions?” If I’m not told to do that there is a big difference in whether I’m going to do it or not, or have the incentive to do it. I would say that building that policy infrastructure for me really stands out (Municipal sustainability planner: September 23 2014).

In this case, the sustainability planner offered a staff-support resource for the council to understand complex issues associated with climate change impacts and adaptation at the local scale. This municipal evidence provides valuable insight into a capacity-building approach to enable political leadership and action on climate change. The councilor corroborated:

When a decision comes up, and I feel that there is an environmental or climate factor, I’ll bring that up. But the other people around the table people have not sat at those workshops and conferences... if I don’t present the importance strongly enough, or I don’t get it across successfully, then it may just kind of be swept under the table... sometimes my own voice and that, “Hey, hey, let’s spend a little extra, because of environment,” it doesn’t go far. So, I think it’s certainly part of our policy, and part of our just everyday decision making, to include some of these issues and topics, and to review the MCCAP or the ICSP... (Municipal councilor: September 23 2014).

The interviewee further discussed how policy success related to better definitions of jurisdictional responsibility between municipalities, and the determination of the best scales of governance for building capacity to addressing climate change adaptation issues. The councilor highlighted how incentive-based policy infrastructure importantly enabled inter-governmental collaboration and capacity building on matters of building political awareness and support for municipal adaptation, affirming that multi-level adaptation policy initiation materially is an effective method for building local political buy-in to adaptation planning.

The councilor in the Municipality B also discussed how upholding public expectations and having the staff assistance to understand complex planning problems like climate change adaptation informed her decision-making, but did not guarantee political unanimity in decision-making. These results suggest that political support for integrating adaptation into municipal planning and operations occurs as an incremental process of personal relationship building for shifting organizational and ‘cultural’ changes within the planning and policy-making processes and decision-making actions of municipal staff and council. As the MCCAP demonstrated in this case, political leadership may be also be enabled by multi-level mandates and the capacity support of sustainability planners as important social factors impacting political support and leadership for adaptation planning and policy making at the local scale.

6.6.2.3 Municipality C: Challenges of future optimism in a low capacity environment

Policy integration in Municipality C lacked a clear municipal adaptation ‘champion’ capable of setting a clear policy or political agenda for adaptation in ways observed in Municipality B. The mayor identified how access to financial resources was very important as an incentive for taking actions in fiscally constrained municipalities, further corroborating the importance of the gas tax as an impetus for political buy-in and support for MCCAP adaptation planning. However, the mayor also discussed how differing political interpretations of matters of ‘importance’ among councilors created conflicts in her municipality’s decision-making processes.

A combined lack of fiscal resources and staff capacity as well as a lack of clarity in inter-jurisdictional policy responsibilities, in addition to lagging inter-governmental collaboration and more difficult values-based issues associated with municipal adaptation. Interviewees perceived these barriers exacerbating the achievement of political unanimity on adaptation integration in this municipality. The mayor discussed how the values and norms of individuals affected collective decision-making processes and perceptions of matters of ‘importance’:

What’s important, and what’s believed to be important... identifying that when working with a group of people, it’s because some people don’t want to hear anything different they just want to

believe what they believe... certainly formal and informal values, social norms... that's a really difficult one... identifying what is important versus what somebody believes is important is the biggest challenge... (Municipal mayor: September 24 2014).

The Mayor discussed the opportunity for including the priorities identified in the MCCAP in a future municipal planning strategic update, conducted as a public review process. The Mayor perceived this approach a pragmatic way of addressing issues associated with coastal climate impacts, and municipal drainage issues affected by flooding in recent storm events.

In a municipal decision-making environment lacking political consensus while fiscally constrained, the CAO from the second municipality summarized: 'Most of these things rest on two things: the political will and the economic resources to deal with it' (Municipal CAO: September 24 2014). The CAO also discussed the political challenge of meaningfully considering the tangible environmental impacts of development projects in municipal decision-making processes and how this presented the biggest political challenge. The CAO discussed how staff was 'ad-hoc' integrating adaptation policy priorities informally in maintenance and operation processes (e.g., managing salt-water intrusion on coastal wastewater infrastructure).

The CAO further discussed how political leadership was diminished by policy incoherence related to inter-departmental communications and funding regimes for municipal adaptation from the province. This 'disconnect' in provincial collaborations had been discouraging and diminished political support at the municipal scale, cynically noting discordances in some provincial 'agencies telling us that this is vital and other agencies not providing support...' The CAO also highlighted how stakeholder values and norms, public opinion and pressure, as well as the availability and distribution of fiscal resources, were important influences in generating political will for climate change adaptation, further corroborating the influence of the gas tax on political support for the MCCAP.

The emergency management coordinator pragmatically discussed how adaptation mainstreaming required staff leadership from CAOs to integrate climate change adaptation into daily operations to encourage municipal officials. Further political

barriers related to lack of funding for implementation were perceived to deter from the generation of political support for sustained efforts for adaptation implementation and staff motivation on the issue on the municipal agenda and priorities. The respondent discussed the need for access to funding and expertise to capacitate adaptation actions; identifying how generating political support for pursuing funding from sponsor organizations (e.g., Federation of Canadian Municipalities Green Municipal Fund), provided exemplar approaches for taking advantage of the short-term opportunities to build longer term local sustainability, and thus build political momentum and support for sustainability and climate adaptation over time by building on small successes (e.g., framing farmer's markets as a locally beneficial economic, social and environmental activity and also as a transformational response to climate induced imported food insecurity, while also generating political support for external funding applications).

6.6.3 Discussion: adaptation integration and political support

Policy success is dependent in part on the cultivation of 'political will' – the willingness of publicly elected officials entrusted with political decision-making authorities to capacitate, approve, implement and/or enforce public policies that in turn set a course of action to address specific policy issues (Post et al., 2010). Barriers related to ambiguities associated with understanding how political direction is set, including conflicting policy preferences among decision-makers related to policy solutions, often hampers policy success (Wu et al., 2010).

The literature suggests that generating political will is an essential enabling condition for local adaptation policy development (Ford and King, 2013; Wilson, 2006). Further evidence suggests that high level political will is an instrumental component of adaptation policy success (Solecki, 2012; Burch, 2010). By framing policy options in terms of the co-beneficial outcomes that are achievable through taking adaptation actions (e.g. continued gas tax, community well-being, emergency management), wider political appeal of co-benefits and buy-in for adaptation priorities from a diversity of stakeholders, including public officials, may be generated and the political will for adaptation may be realized (Aall, 2012; Henstra, 2012).

In the literature, weak public interest or demand, perceived political trade-offs between current expenditures and long-term, uncertain benefits, lack of clarity in inter-governmental policy jurisdictions and competing demands for scarce resources in fiscally constrained environments, act as hindrances to the perceived importance of climate change adaptation as a policy priority for public political actors (Hjerpe et al., 2014; Juhola et al., 2012; Measham et al., 2011). While these barriers also exist in Nova Scotia, the generation of political will for adaptation appears to have been broadly enabled through linking incentive-based MCCAP policy architecture and capacity-building resources, with the added value of the sustainability planner in one municipality illustrating an example of an adaptive capacity-building mechanism for supporting deeper municipal adaptation integration and contributing to the generation of political will for adaptation.

Evidence was observed in all cases of the powerful policy agenda setting influence of multi-level resource allocation on municipal political decision-makers, in that the gas tax was perceived to be a top-initiating factor for municipal adaptation and relatedly the fiscally incentivized generation of local political will for adaptation planning. Further comments related to leveraging financial opportunities for external funding as a means for advancing political will for adaptation were discussed. However, negative municipal political perceptions of the lack of policy coherence horizontally between departments of the provincial government, as well as negative perceptions in relation to federal political leadership in setting a congruent policy agenda for climate action across governance levels, were observably noted across cases.

The empirical evidence provides fresh insight into the social processes underlying the cultivation of political will for adaptation at the local scale, and the variable means and ways of addressing ambiguities associated with generating local political leadership for adaptation. Based on the survey results and interview findings, there appears to be social correlations between levels internal staff capacity and municipal political leadership and social support for tackling complex issues like climate adaptation at the local scale.

Staff leadership in facilitating collaboration with council was deemed to be an important social factor for adaptation integration for several reasons. First, staff works regularly with council to raise support for undertaking climate adaptation public awareness through educational initiatives. Second, staff works with council to encourage inter-municipal responsibilities and regional collaboration on matters of integrated risk reduction. Third, staff works with council to develop plans that require internal municipal political leadership, to facilitate inter-departmental operational collaborations to implement adaptation measures. Fourth, staff and council work together to make strategic linkages between adaptation planning priorities and the material logistics of council capital investment planning and municipal budgeting priorities and decision-making processes.

In each municipality, political leadership was perceived to correspond to public demand that in relation to the issue of climate change adaptation was not deemed to be an issue topping public priorities on municipal policy agendas. In combination with more immediate concerns related to accessible capacity building resources, funding and existing needs related to funding infrastructure vulnerability; the broader multi-level governance and socio-economic context, and a desire for political leadership from higher levels of government, were seen as key social factors impacting the cultivation of municipal political will for adaptation.

In the absence of political will for making transformational changes to municipal decision-making processes and operating procedures, the evidence suggests that adaptation planning and policy-development is a staff-driven process of making incremental changes to existing municipal organizations and governance processes, as a functional and duly diligent practical response to pragmatically integrating adaptation, given the broader uncertainties and constraints hindering political support for adaptation policy developments. Based on the MCCAP evidence, integrating adaptation into development and land-use planning processes may be perceived to provide an operable framework for adaptation integration. The contributive added capacity of sustainability staff positions advancing the ‘normalization’ of adaptation rhetoric and the inculcation of environmental sustainability values among political and staff municipal representatives was observed in one case. In Municipality B, the positive impact the councilor perceived

the sustainability planner to have had in contributing to improving environmental considerations at the local scale by contributing to assisting with raising the councilors awareness of the opportunities for upholding public expectations related to the environment, and climate change adaptation more broadly.

Cultivation of municipal adaptive capacities related to acculturating knowledge and developing skills to make use of complex information, as well as enabling institutional policy architectures in the broader social landscape of climate change becoming a normalized topic were discussed as important social factors impacting the integration of adaptation vis a vis the development of political support. Replication of successful policy practices and means of taking incremental actions to build local momentum and political support for addressing the ‘bigger picture’ climate issues through co-framing that was more socio-economically tangible, palatable and contextually relevant were discussed as means of generating political support and influencing the political values for adaptation at the local scale.

In the MCCAP case study, multiple interviewees highlighted the importance of adaptive capacity levers such as the skills to make use of information, staff champions and related resource capacity availability, as well as enabling incentive-based policy architecture, as important elements contributing to adaptation integration in municipal staff and council’s social norms, expectations and decision-making processes requiring political leadership.

The evidence suggests that there are diversity of contributing factors affecting the underlying social processes related to the generation of adaptation policy options, as well as the broader social aspects that affect the generation of ‘political will’ for implementation and the political buy-in required for leading proposed courses of policy action (May, 2005). In the case of the MCCAP, fiscal incentives, staff capacity and champions and broader socio-cultural norms and expectations related to the functionality of institutional structures figured prominently as social impact factors affecting the generation of political will at the local scale in the case study evidence.

In the case study, differences in one municipality’s staff capacities to undertake the MCCAP through the presence of a staff champion may have added a greater enabling

value to the gas tax incentive and policy architecture monetizing adaptation policy and planning and corresponding the political will for adaptation planning. At least for the councilor in Municipality B, the presence of the sustainability planner and a civic sense of upholding public responsibilities, appeared have been social impact factors positively influencing the creation of social norms and expectations (political will) surrounding her perspectives about adaptation decision-making processes in the municipality. By contrast, in the other municipalities lacking the sustainability planner, stakeholders were faced with completing the MCCAP process without additional ‘in-house’ expertise to regularly inform council on matters of adaptation planning importance. In turn, this lack of internal capacity required outsourcing of the adaptation planning process to consultants’ and academic experts. While useful for meeting the MCCAP reporting requirements, the lasting contributions of these approaches to sustaining organizational learning and adaptation and in turn contributing the political will for integrated approaches for climate adaptation is speculative at best. More rigorous investigations would help to yield more reliable results of these social aspects of institutional adaptive capacity building for municipal adaptation success.

Interviewees reported that sustaining municipal buy-in for adaptation requires continued social ‘normalization’ of values and expectations through the provision of skills, knowledge, resources and capacity-building for municipalities, as well as for the public, in order to raise awareness and expectations while continuing the process of adaptation to climate change at the local scale. These aspects were generally perceived to be lacking, with a sense that enabling adaptation integration required further leadership from higher levels of government to address institutional constraints, while facilitating capacity-building collaborations that can support adaptation stakeholders locally.

Embedded socio-political and socio-economic considerations of adaptation planning have not been thoroughly addressed in this study, and are pertinent areas for future documentation and analyses. Deeper considerations of the broader societal and contributive socio-economic factors impacting the advancement of adaptation governance approaches are required. This would entail critical explorations of the wider policy incoherence that exist in multi-level climate change governance structures and the

complex political economies of nation states tasked with reducing emissions and adapting to future impacts associated with a rapidly changing atmosphere. Reducing greenhouse gases is in the long-term the best adaptation strategy to reduce the global, biophysical consequences of anthropogenic induced climate change. Tangibly cultivating political leadership for adapting to impacts and reducing emissions at the local scale requires attention to social factors that can impact how plans become priorities and actions, including transformative shifts in power/subjectivity (Manuel-Navarette and Pelling, 2015). This includes vertical dimensions of political leadership, horizontal aspects of collaboration and multi-stakeholder governance processes that normalize and enable climate decision-making politics for municipal councils (See Figure Eight).

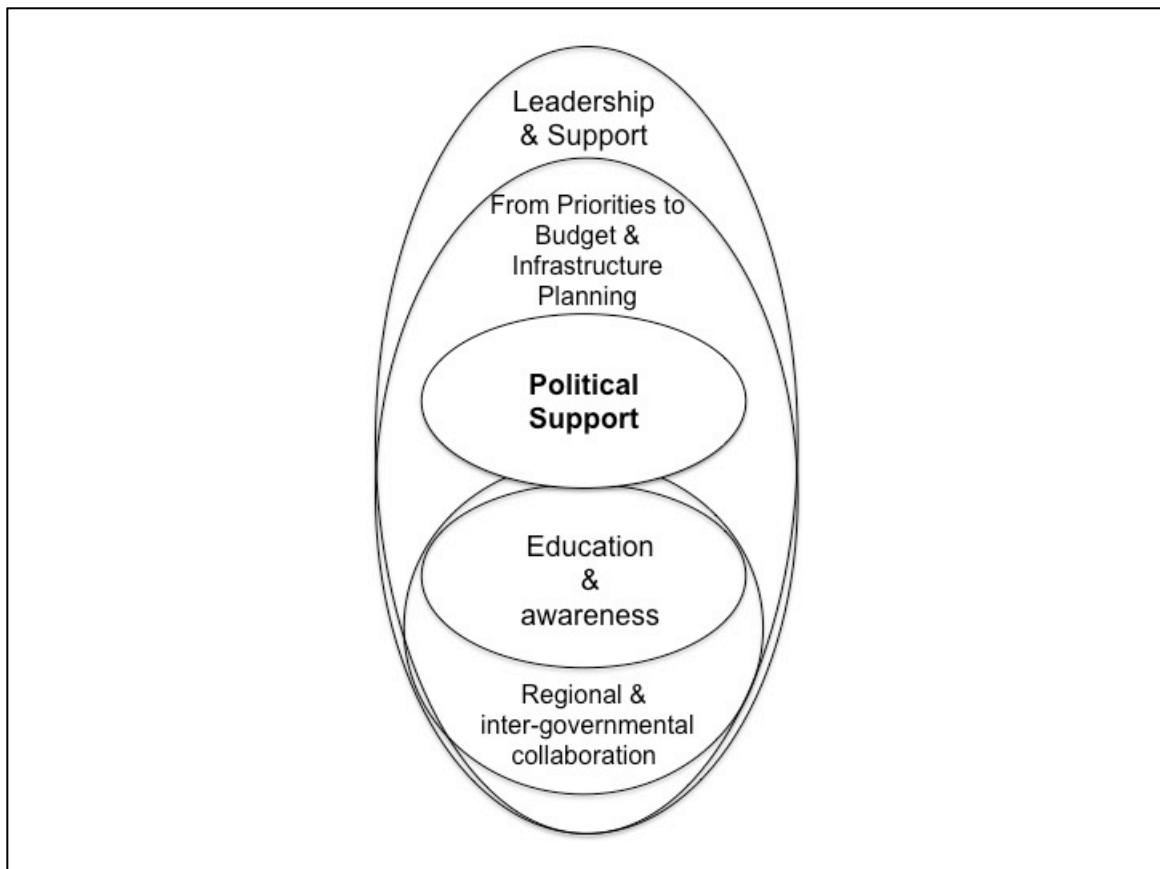


Figure 8: Conceptual illustration of social factors impacting adaptation political support

6.7 Summary

In Nova Scotia, harnessing provincial and local knowledge and expertise through multi-stakeholder collaborations appears to be socially important for coordinating the adaptation agenda and supporting first steps towards adaptation policy integration; including by building political support for adaptation integration into the day-to-day activities of municipalities (Horak, 2012). Key findings of this across individual case study include:

- Adaptation integration is affirmed to be required in Nova Scotia's municipalities in order to provide policy coherence; however the evidence suggests that adaptation policy integration is hindered by institutional constraints and lack of political will and coordination across levels of government;
- Important adaptation integration constraints include: lack of additional funding; competing priorities in an environment of scarce financial resources; lack of integration of climate change into municipal planning and budgeting processes; and a lack of staff time and/or need for additional human resources/expertise to proceed with cost-effective, efficient and sustainable adaptation planning implementation and policy integration at the local scale;
- Regional collaboration on emergency and land-use planning and climate change adaptation is believed to present opportunities for integrating adaptation;
- Important municipal/regional opportunities for collaboration on flood elevation/land-use planning, integration into long-term emergency planning, and integrating climate change into capital investment budget planning processes currently exist;
- Contributive regional opportunities for inter-governmental collaboration in clarifying matters of policy jurisdiction and coastal risk management present further feasible means to support policy integration and adaptation mainstreaming in Nova Scotia municipalities;
- Further developing shared collaborations with academia on best practices, public education and awareness-raising initiatives presents social opportunities for advancing adaptation integration and political support for actions;

- Developing monitoring methods to document local climate change impacts and measure MCCAP adaptation planning implementation progress and effectiveness are required longitudinally over time.

Key social constraints and factors impacting the generation of municipal political support for adaptation include: i) a lack of public expectation/advocacy for adaptation; ii) an overarching lack of clarity of intergovernmental jurisdiction/responsibility related to the division of roles and responsibilities for multi-level adaptation governance; and iii) means of supporting adaptation facilitation and implementation through increased capacity at the local scale to adapt operations, daily practices and decision-making strategies.

Sustainability planning offers a deliberate capacity-building agency and added staff capacity may contribute to facilitation and translation of the meaning and context of climate change vulnerability risk analysis findings for political stakeholders. In turn, this may contribute to municipalities' overall capacities for integration of adaptation. It is suspected that adaptation integration requires deliberate facilitation through increased capacity at the local scale to 'decipher' meaning in climate change vulnerability and risk analysis and then tangibly translate findings incrementally into municipalities' operations, daily practices and the decision-making strategies of political decision-makers.

The generation of political will is understood to be an essential social condition for adaptation policy development and integration. However there are multiple barriers and constraints to the autonomous emergence of political will, not the least of which is that there is a negligible amount of public demand for action on the ambiguous and unclear policy issues associated with addressing climate change adaptation and mitigation at the local scale, particularly in small town municipalities of Nova Scotia, Canada.

In contrast, by having local agendas set through hierarchal policy mandates that enshrine certain social norms and expectations through the use of incentive-based public policy processes and capacity-building collaborations, plausibly enables and positively contributes to generating planning processes that lead to greater stakeholder awareness

and political will for adaptation. This draws conceptual attention to the policy power of multi-level governance differences in resource distribution authority and jurisdiction (Horak, 2012). In the case of Nova Scotia, through the use of a familiar, incentive-based policy lever associated with a financial expectation, political stakeholders gained a greater awareness and willingness to act on adaptation planning and integration.

Enabling a greater sense political will may support the longer-term integration of adaptation through incremental efforts and actions to address outstanding policy issues related to institutional jurisdictions, lack of capacity and so on. Additionally, co-beneficially framing climate change adaptation as a long-term planning and emergency management issue also appears to be contributive to enabling the conditions for political leadership on issues of climate change. Further incorporating MCCAP policy priorities into existing municipal planning strategies and improving inter-governmental collaborations presents substantial opportunities for co-beneficially advancing adaptation integration, with the corollary support of local decision-makers.

Political leadership is also important for public education, mainstreaming and integrating adaptation into policy and planning processes and facilitating stakeholder collaborations. Specifically there are important roles for local political leadership to support: public education and awareness raising on climate change risks and resiliency, inter-municipal collaboration on emergency planning and integrated approaches to land-use planning to reduce climate change risks, as well as facilitating internal municipal staff motivation and inter-departmental collaborations on adaptation policy integration, and the integration of adaptation priorities into municipal capital infrastructure planning and budgeting.

A broader desire for Canadian political leadership from the federal and provincial government on matters of clarifying policy jurisdictions and providing access to information and resources were widely perceived by all municipalities as materially important social factors for facilitating cross-governance stakeholder engagement and political support for adaptation integration and building of adaptive capacity at the local scale. The national-municipal nexus was not rigorously probed in this study, presenting a key research opportunity for future analysis.

Multi-level climate change governance requires leadership and support to provide a reinforcing, positive capacitation of climate actions such as the formulation of adaptation policy options to address long-term climate change uncertainties. In multi-level governance contexts, climate change leadership requires overcoming institutional obstacles to build capacity, establish reliable funding, develop accountability through monitoring and evaluation measures, as well as to promote information sharing and cross scale learning. Corfee-Morlot et al., (2009) add further that there is a parallel need for higher levels of government to lead by creating the institutional pathways and governance structures that are facilitative of integrated, multi-level adaptation approaches.

They argue such governance coherence can contribute to enshrining cost-effective climate policy solutions that can contribute to the congruent deliverance of larger, ambitious climate policy goals successively over time. Low-regrets adaptation actions to reduce the risk of climate impacts, including integrating adaptation principles and practices into day-to-day operations and municipal decision-making by increasing multi-level support and municipal funding for staff resources and capacity-building activities. Added capacity may increase the likelihood of adaptation integration, which is both indirectly and directly contributive to advancing the assortment of adaptation policy and planning actions available, to reduce vulnerability and increase resilience to climate impacts such as hurricanes, floods and sea-level rise (IPCC, 2014; Bouwers and Aerts, 2006).

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Chapter Seven

7 Key Findings, Contributions, Conclusion and Recommendations

This final chapter summarizes the major theoretical, methodological and policy relevant findings and contributions of the study and further discusses the implications of the research for municipal climate change adaptation planning theory, research and policy development in Nova Scotia and more broadly. It concludes by highlighting important future directions for adaptation planning and policy research.

7.1 Introduction

This dissertation has explored, described and illustrated what and how social factors impacted climate change adaptation planning processes in Nova Scotian municipalities. The research documents an intentional, substantial and concrete example of a multi-level adaptation governance planning context created by the provincially leveraged gas tax policy mandate and MCCAP reporting requirement for all Nova Scotia municipalities to prepare adaptation plans or face the risk of losing infrastructure funding from the province (Dupuis and Biesbroek, 2013; SNSMR, 2011).

One of the objectives of this research was to construct a conceptual research framework based on policy studies and adaptation literature to incrementally contribute to advancing methods for comparative analysis of municipal adaptation planning and policy making processes in different case settings. This builds on accepted conceptualizations of multi-level climate change governance, as a fluid social landscape constituted of institutions interacting across and between levels of government, both vertically and horizontally (Corfee-Morlot et al., 2009). Horak (2012) suggests focusing on the coordination problem in multi-level governance research by giving consideration to institutional fragmentation and the differential and inequitable distribution of power and resources between levels of government as key social factors impacting the ways and means by which policy agendas are set, and how authority is delegated to allocate and distribute resources for implementing policy priorities. For example, this conceptual foundation underscores how federal and provincial funding can provide incentives for taking action

to adapt to climate change at the local scale through existing multi-level governance policy mechanisms such as the gas tax policy regime.

Climate change governance research seeking to explore, describe and evaluate multi-level governance must remain cognoscente and aware of the broader socio-political landscape of municipal policy making. Corfee Morlot et al., (2009) offered three questions and eight suggested good practices as a conceptually grounded method for evaluating climate change governance interventions, and this framework is later described in comparison to the MCCAP evidence as a means of synthesis and summary.

The policy process analysis developed for use in this research built on a staged model (Jann and Wegrich, 2007) of universal policy making functions (Wu et al., 2010) to explore, describe, illustrate and discuss MCCAP empirical evidence related to three conceptual adaptation policy-themes and seven functional policy making sub-themes affecting adaptation policy making processes in municipal case environments:

1. Initiation: i) adaptation agenda-setting (Kingdon, 2003; Birkland, 1998; Cobb et al., 1976) and; ii) problem framing (Spector and Kitsuse, 2001; Dery, 1984);
2. Capacity-building: iii) policy formulation (Wu et al., 2010; McBean and Rodgers, 2010; Howlett et al., 2009) and, iv) policy prioritization (Smith et al., 2014; Noble et al., 2005); as well as,
3. Integration: v) stakeholder and public engagement (Sherman and Ford, 2014; Tompkins et al., 2008; Bryson, 2004; Conde and Lonsdale, 2004); vi) the roles for political support (Ford and King, 2013; Post et al., 2010; May, 2005) and, vii) social factors impacting the barriers and opportunities for policy integration (Krause, 2012; Kok and De Conink, 2007; Bouwers and Aerts, 2006).

This thematic, functional approach proved to be a useful rubric for researching and assessing the social factors impacting municipal and provincial adaptation agenda setting, problem framing, formulation of adaptation planning options and priorities and the barriers and opportunities integration of adaptation plans into municipal and provincial processes. The roles of cross-scalar political leadership in multi-level adaptation governance were considered with respect to their impact on institutional capacities for

enabling municipal adaptation. However, this topic of the national/municipal nexus of climate change policy coordination presents a frontier for future research.

The conceptual framework was triangularly operationalized as the basis for conducting a content analysis of Nova Scotian municipalities' adaptation plans (Appendices B1-B4), and through the iterative collection and testing of primary data with MCCAP stakeholders, using focus groups (Appendices E1 and E2) and an iterative online survey (Appendices G1-G4) to conduct individual case analysis based on interviews with municipal adaptation stakeholders to determine variance and patterns across cases (Appendices F1 and F3). The goal was use the same uniform method to produce empirical evidence capable of elucidating on the social impact factors that affected municipal adaptation planning processes, while also narrowing the scope of prioritized factors that impact municipal adaptation policy making, to illustrate how these factors manifested at the individual case level of three municipal adaptation planning processes. The ultimate objective was to contribute to both a place-specific and a narrower understanding of the social factors that impact the development and implementation of municipal climate change adaptation plans and policies at both the local and provincial scale, in a multi-level adaptation governance context.

7.2 Summary of key findings

Chapter Two and Three constructed a research agenda and a thematic, functional conceptual framework based on existing literatures through which to conduct content analysis and primary data collection and analysis about multi-level climate change adaptation governance. This assessment work was premised on the acknowledgement that the scope and substance of research related to adaptation policy and planning processes remains nascent and limited due to the singular nature of most adaptation case study research and lack of concrete examples of multi-level adaptation governance frameworks (Dupuis and Biesbroek, 2013; Murtinho and Hayes, 2012; George and Bennett, 2005). The chapters developed an exploratory and descriptive research agenda and study design aimed at enhancing comparative studies at the municipal scale, in particular by shedding light on the social impact factors affecting municipal adaptation planning and multi-level adaptation governance contexts (Vogel and Henstra, 2015). The

research sought to advance applied understanding and conceptual knowledge related to the social conditions and factors that support or hinder local governments' building capacity and taking action on climate change, in a multi-level governance context (IPCC, 2014; Richardson, 2012; Jones, 2012; Bizikova et al., 2008; Gupta, 2007; Rose, 2005).

Developing empirical and conceptual knowledge of the adaptation policy process and the conditions enabling or constraining policy development and implementation at the local scale grew out of insights into comparative assessment and analysis of the adaptation policy making process (Adolino and Blake, 2011; Burnham et al., 2004), and the categorical organization and methodological assessment (Maxwell, 2004; Rutman, 1984; Froman, 1968) of the content of municipal plans. Four additional objects were considered in policy content analysis that comparatively assessed adaptation goals (Stone, 2002), targets (Schneider and Ingram, 1990), instruments (Henstra, 2015; Howlett, 2011) and agents (Richardson, 2012, Measham et al., 2011). For example, see Appendix B3 and Appendix F3.

Chapters Four, Five and Six utilized the conceptual research framework established in Chapters Two and Three to explore, describe and illustrate social factors impacting multi-level adaptation governance and municipal adaptation planning processes within the MCCAP case study. This empirical research operationalized the thematic functional conceptual framework as the basis for categorizing and contrasting conceptual knowledge with empirical evidence to develop knowledge and understanding of the comparative social factors impacting municipal adaptation planning processes. A triangulated research approach utilized: i) content analysis of MCCAP plans; ii) three methods of primary research ((a) focus groups, b) interviews and, c) an iterative online survey) to gather and analyze data to illustrate and discuss social impact factors affecting the municipal adaptation planning process in Nova Scotia; and, iii) conceptual knowledge about municipal adaptation in a multi-level governance.

7.2.1 Adaptation initiation: Agenda-setting and problem framing

What initiates and frames the problem for municipal adaptation planning in multi-level governance context?

The MCCAP case presents new evidence of a multi-level governance policy and planning approach for addressing risk issues of municipal climate change adaptation in Canada. Nova Scotia's policy innovation was the utilization and leverage of an existing multi-level governance policy instrument (e.g., gas tax) to link a federal-collected (but provincially administered) funding stream, to a mandatory municipal adaptation planning reporting requirement (e.g., MCCAP). The Nova Scotia MCCAP case illustrates a valuable first Canadian example of a multi-level adaptation governance policy framework for monetarily incenting municipalities to plan for climate change impacts, by using provincial policy power over municipal resource distribution to set an adaptation planning agenda that initiated municipalities' to begin policy and planning processes for assessing municipal vulnerability, prioritizing potential climate risks and developing possible adaptation actions for infrastructure and land use planning under municipal jurisdiction. In this way, the MCCAP was coordinated through multi-level governance using hierarchical policy power to set a municipal adaptation agenda and enable institutional adaptive capacity building (Horak, 2012; Smit and Wandel, 2006).

The MCCAP process occurred in 51/53 municipalities - instigating vulnerability assessment, risk prioritization and increased stakeholder capacities for proactively addressing municipal climate change risk issues through integrated approaches to land-use and emergency management planning, in addition to other mechanisms. The process exemplified an attempt at municipal institutional capacity-building through a multi-level adaptation governance approach (SNSMR, 2011; Smit and Wandel, 2006). The analysis of the MCCAP planning process revealed a widespread recognition that the multi-level governance structure and monetary incentive of the pre-existing gas tax transfer mechanism was the most important social impact factor for achieving the full compliance of municipal agents and stakeholders with the completion of MCCAPs. This finding affirms Hanna et al., (2014) who noted that variance in Canadian municipalities adaptation efforts may relate to the strength of provincial policies.

Nova Scotia's example of building on previous adaptive capacity building and policy making initiatives through the utilization of the social 'norm and expectation' of the monetarily valuable gas tax transfer to achieve municipal compliance with the MCCAP mandate, illustrates a powerful mechanism for framing the problem of local adaptation policy and planning development and incentivizing municipal climate change actions.

Climate hazards and coastal risk problem framing also relates to underlying, place-based, collective social values, norms and expectations related to previous knowledge and 'focusing event' experiences with climate change impacts (Birkland, 1998). Historical knowledge and experience with disasters (e.g., Juan, 2003) and recovery, invariably contributed to enabling Nova Scotia's adaptation policy-making stakeholders to buy in to the MCCAP process. Preceding MCCAP, successful policy-making efforts had opened entrepreneurial policy windows for the development of adaptation initiatives that built a supportive social landscape for undertaking the innovative MCCAP multi-level adaptation governance initiative within the Province of Nova Scotia and its municipalities (e.g., SNSMR, 2011; HRM, 2007; ClimAdapt, 2005; Kingdon, 2003).

Nova Scotia's approach to enabling substantial, intentional and concrete mandatory adaptation planning through monetary policy incentives, in the absence of sustained public demand or widespread political leadership, provides strong evidence of the need for internally-led processes of multi-level governance to support municipalities to undertake adaptation planning (Dupuis and Biesbroek, 2013; Cobb, 1976). The 'monetization of adaptation planning' approach adopted in Nova Scotia was the major determinant for enabling adaptation planning at the municipal level to occur, which as this case study has illustrated, when combined with appropriate framing and capacity-building that enables stakeholders, can largely be perceived as a beneficial process for the initiating of local scale climate change risk identification, prioritization and planning. While the provincial MCCAP policy instigation occurred through the non-exclusionary usage of a hierarchical monetary incentive, the ancillary and co-beneficial widespread utilization of capacity-building resources and multi-stakeholder collaborations also were impactful social factors framing the need for developing better collective understandings of climate risks through adaptation policy formulation processes that identified and

prioritized opportunities for addressing contextualized municipal climate change adaptation issues, including through institutional adaptive capacity-building.

7.2.2 Adaptation capacity-building: Stakeholder and public engagement, policy formulation and risk prioritization

What contributes to enabling adaptation capacity building and the social conditions for municipal adaptation planning?

Partnerships with academia, NGOs, and consultants, as well as horizontal and vertical inter-governmental collaborations at municipal and provincial scales, provided instrumental capacity-building agencies for municipalities' to assess hazards, risks and vulnerabilities. Stakeholder collaborations contributed to the consolidation of existing knowledge of climate change hazards through the formulation of their municipal adaptation plans (IPCC, 2014). However, while provincial collaborations were active and fruitful, it is notable that a low degree of engagement with the federal government was reported in focus groups, interviews and content analysis findings.

The research found that multi-level adaptation governance policy mechanisms such as the monetary incentive to complete climate change adaptation plans were further enabled by the provision of a combination of various capacity-building resources (e.g., MCCAP Guidebook; stakeholder workshops), as well as through external collaborations with governmental, non-governmental and academic stakeholders. The net result was an adaptation planning process that helped to effectively frame climate change risks for municipal stakeholders' tasked with the formulation of adaptation plans based on assessing and prioritizing climate change risks through planning and policy making processes.

MCCAP formulation occurred largely through internal committee structures and expert stakeholder collaborations at the municipal and provincial scale. The utilization of hazard risk and vulnerability assessment processes to assess and inform the prioritization of contextual municipal adaptation and climate change risk issues were observed. While public engagement was not a requirement of the MCCAP process, public involvement in the MCCAP formulation did occur at various stages and through various capacities, as

detailed in individual case study findings. However, public participation was not mandatory, and ‘medium’ levels of public participation were reported, plausibly due to several factors related to time, resources, and concerns about alarmism or quality of information gathered through public forums. Harnessing opportunities for leveraging the MCCAP as a means of public participation and opportunities for community engagement were further discussed within individual cases.

Risk prioritization was largely based on an increased knowledge of critical infrastructure and public safety concerns related to the assessment of proximal hazards, which included assessments of the level of risk that various potential climate hazards presented to municipalities’, and the various risk mitigation options for action. Individual cases highlighted the importance of internal staff capacity and external collaborations to facilitate these processes targeted at rigorous assessment of climate change risks and development of adaptation priorities for actions. However, jurisdictional silos of governance within municipalities, horizontally across municipalities and vertically in relation to the horizontal communication between departments of the provincial government were reported as hindering municipalities’ capacities for risk prioritization, due to diminished access to information decreasing municipal opportunities for collaboration.

This research has illustrated how the MCCAP process helped enable municipalities to develop knowledge and understanding of opportunities for ‘soft’ and/or ‘hard’ options for adaptation to climate change hazards and risks, by exploring how climate change impacts could potentially affect municipal operations, infrastructure development, and emergency management processes and procedures. While the mandatory nature of the MCCAP policy mandate generated widespread compliance and pragmatic planning opportunities for provincial and municipal stakeholders, the process was further enabled by facilitated, multi-stakeholder collaborations that generated opportune capacity building to increase municipal stakeholders’ knowledge of climate change risks by prioritizing vulnerabilities and the barriers and opportunities for action at the local and provincial scale. However, within the MCCAP case many social factors acting and as barriers and impediments to capacity building were also noted (Adger et al, 2009).

7.2.3 Adaptation integration: Political support and the social factors impacting policy integration

How does adaptation-planning implementation in multi-level adaptation governance contexts occur?

Integrating adaptation into municipal planning and emergency management processes and increasing inter-governmental collaboration on issues of clarifying legal responsibilities and policy jurisdictions; as well as, facilitating better access to information and resources were identified as substantial ‘soft’ path opportunities for integrating MCCAPs. However, as has been found in other cases (Hanna et al., 2014; Schauffler, 2014; Ekstrom and Moser, 2013), significant social, political and economic barriers to action persist - hindering the integration of adaptation priorities within the planning processes of Nova Scotian municipalities and provincial institutions. Notably, a lack of municipal capacity (funding, resources, expertise, and time), a lack of multi-level governance coordination and institutional fragmentation (Horak, 2012), lack of public demand and a lack of political will at multiple scales hinder the policy integration of MCCAPs in Nova Scotian municipalities. Existing impediments and barriers present significant opportunities for improving policy congruence and coherent climate change policy making in the Canadian multi-level governance context (SCD, 2015; Burton, 2009).

This case study has documented and confirmed social impact factors affecting municipal abilities to develop and implement adaptation plans (Abunnasr et al., 2013). Many of the reasons hindering municipal adaptation predominantly relate to impactful social factors affecting municipal capacity, resources, time and expertise, in broader multi-level governance contexts. Austere fiscal environments, competing priorities and a lack of political leadership and public demand for action on issues of climate change risk hinder adaptation-planning implementation at the municipal scale. Adaptation integration is further impeded by cross-scale governance interactions and jurisdictionally opaque policy issues that undermine the potential for municipalities to adapt to climate change risks and hazards through multi-level governance collaborations.

7.3 Contributions of the study

The contextualization of adaptation policy making in case study environments and the classification of adaptation policy and planning responses based on empirical evidence, in contrast to conceptual literature and/or other jurisdictions, has applicability to advancing how adaptation and resiliency planning is theorized and practiced (Birkmann et al., 2010). This exploratory, descriptive case study has attempted to illustrate the variable ‘seen and unseen’ social and political factors that impact adaptation policy development in a multi-level adaptation governance context (Sayer, 2000). Combining a thematic, functional conceptual framework with deductive empirical inquiry provides a robust foundation for the development of grounded theory of impactful social factors contextually influencing adaptation to climate change risk (Gupta, 2012). Specifically, this adaptation case study policy analysis of climate change adaptation planning in Nova Scotia, Canada has combined inductive ‘theory-testing’ of using conceptual propositions of impactful social factors initiating adaptation capacity-building and integration contributing to adaptation policy processes, in a multi-level governance context (Ford and King, 2013; Moser, 2009; Smit and Wandel, 2006). Deductive ‘evidence-gathering’ methods has focused on deriving empirical findings (Baynham and Stevens 2014; Tang et al., 2010) from adaptation planning case studies in intentional, substantial, concrete adaptation policy environments (Dupuis and Biesbroek, 2013). Conceptual propositions are compared to the empirical results of the four methods used to gather MCCAP evidence in Appendix H1.

A key contribution of this study is the pragmatic methodology which offers a replicable model for using cases of ‘intentional substantial and concrete’ adaptation governance contexts to test conceptual propositions about institutional adaptive capacity building in multi-level policy environments (Dupuis and Biesbroek, 2013). The MCCAP evidence and conceptual propositions offer a broader contribution to the discourse of adaptation theory development via the documentation of a grounded empirical case study research approach and mixed methodology that helps to generate knowledge of the factors influencing adaptation planning in case settings. The research framework exemplifies methodological innovation and a comparative means for documenting and accreting

knowledge related to nascent efforts to adapt to climate change at the local scale. This exploratory, descriptive study contributes validity and veracity to the conceptual propositions, while widening the scope of future case study analysis based on research discoveries made in the MCCAP multi-level adaptation governance case (See Table 13 below).

MULTI-LEVEL ADAPTATION GOVERNANCE CONCEPTUAL PROPOSITIONS AND MCCAP RESEARCH DISCOVERIES		
<p>INITIATION: Adaptation policy initiation through multi level governance can act as a critical pre-condition for the initiation of adaptation policies and plans in municipalities</p> <p>*There is a notable role for place-based focusing events to influence the adaptation policy making agenda setting and problem framing process in multi-level adaptation governance contexts</p>	<p>CAPACITY-BUILDING: The provision of capacity-building resources through multi-level governance can serve as a key factor for enabling and supporting municipalities' tasked with adaptation policy and planning.</p> <p>* External collaborations with consultants and academics enable municipal capacity-building.</p> <p>** Vertical governance barriers constrain municipal capacity building.</p> <p>*** Horizontal regional collaboration enables municipal capacity-building.</p> <p>**** Internal staff capacity enables institutional adaptive capacity.</p>	<p>INTEGRATION: Adaptation policy and planning implementation in municipalities can be enabled via both the conditional and sustained provision of capacity building resources, provided through multi level governance approaches</p> <p>*Multi-level adaptation governance coordination, facilitation and leadership is required to address municipal adaptation issues. Institutional fragmentation is associated with problems of inter-governmental collaboration, policy jurisdiction, access to information, access to funding, horizontal emergency planning collaboration and coordinated coastal land use planning reform, and the need for increasing public education on climate adaptation and emergency preparedness to reduce vulnerability to climate impacts at the local scale where storms, surges and sea-level rise manifest.</p>

Table 12: Conceptual propositions and MCCAP research discoveries

The research design provided both a breadth and depth of empirical evidence of the social impact factors affecting adaptation planning at provincial and municipal scales to compare with the conceptual propositions. Critical and iterative inquiry sought to provide a 'explanatory interpretation of the outcomes' (Sayer, 2000) of the MCCAP process, with a focus on ascertaining the 'what' and 'how' of social factors impacting

municipal adaptation in a municipal-provincial multi-level governance context. This approach is consistent with George and Bennett (2005) who suggest that descriptive, exploratory within case and across-case methods of comparison provide ‘the strongest means of drawing inferences from case studies’ (18).

The conceptual research framework (Vogel and Henstra, 2015) offered an effective diagnostic tool and heuristic device for developing a comparative understanding of the contextually impactful factors affecting municipal and provincial adaptation planning and policy making in Nova Scotia, Canada. The pragmatic methodology contributed to the incremental advancement of comparative case study methods for categorically generating knowledge and understanding of the initiating and enabling conditions for local-scale adaptation planning and policy development.

The importance of sustaining policy making progress through enabling governance strategies that support local adaptation policy and planning efforts, was clearly demonstrated in the case of Nova Scotia. Continuing the iterative development of adaptation planning research methods and adaptation policy theory development necessitates further comparative adaptation policy case studies and further longitudinal studies and breadth analyses (e.g. Porter et al., 2015, Hanna et al., 2014) of adaptation policy interventions such as MCCAP, in order to continue the theoretical development and applied knowledge of social processes of ‘sustainable adaptation’ (Eriksen and Brown, 2011).

The experimental research approach addresses gaps of knowledge related to the complex social dynamics of how climate adaptation planning processes are initiated, capacitated and integrated at the local scale in multi-level governance contexts. The particularly acute place-based vulnerabilities explored and described in the Nova Scotia adaptation case study relate to the social processes of adaptation planning and policy-making in multi-level governance contexts. This study has contributed empirical evidence worthy of broader scholastic triangulation and case method replications in order to more rigorously comparatively investigate the social factors impacting the multi-level adaptation governance of climate risk at the municipal level in other jurisdictions. Longitudinal

research about how the MCCAP implementation process manifests in Nova Scotia, may further contribute to enhancing knowledge of how municipal adaptation plans are enabled or constrained in multi-level governance environments.

Research and analysis of the social factors impacting municipal adaptation in Nova Scotia illustrate conceptual and applied findings relevant to the advancement of climate change preparedness and risk reduction policy theory and applied policy developments for other jurisdictions of Canada and more globally. For example, using the Nova Scotia multi-level governance approach to incenting and monetizing the completion of adaptation planning and policy making at the local scale provides research opportunities for bridging conceptual/empirical lacunas in the broader understandings of the social factors and conditions that lead to the initiation, capacitation and integration of adaptation planning and policy at the local scale.

Research priorities achieved in this study include: i) offering a contextual depth description of how adaptation planning and adaptive capacity-building has occurred at in the multi-level adaptation governance context of Nova Scotia municipalities; ii) addressing the need for developing a method capable of prioritizing how and what social impact factors affected how Nova Scotia's multi-level governance 'MCCAP' policy making architecture for municipal adaptive capacity-building and institutional adaptive capacity strengthening, and; iii) providing conceptual and empirical findings and recommendations about how to address complex issues of climate change risk impacting upon coastal municipalities through multi-level adaptation governance policy mechanisms to support local adaptive capacity building.

For example, stakeholder forums to clarify inter-jurisdictional legal responsibilities and policy jurisdictions may provide integrated opportunities for facilitating better climate change planning and policy and the implementation of mitigation and adaptation actions across all scales of Canadian government. Opportunities for using existing policy-mechanisms (e.g., gas tax), may create nationally aligned, collaborative policy making approaches that can facilitate incremental climate change actions and climate change vulnerability risk reduction at the local scale where impacts manifest.

The online survey results, which re-tested and verified findings generated in content analysis and focus groups, provided an iterative secondary test of both conceptual and empirical materials. Survey findings achieving greater than 75% confidence levels are consolidated here to provide a synthesis of the applied policy analysis research outputs of this study. These results provide an overview of the major applied findings for stakeholders interested in pragmatic knowledge about adaptation policy options to improve the governance of adaptation to climate change risks through municipal, regional and provincial scale policy making and planning processes in the Canadian multi-level governance context.

7.3.1 Adaptation initiation: Agenda-setting and problem framing

Multi-level governance approaches that utilize combined monetary incentives and corollary reporting requirements exhibit an instrumental policy mechanism for setting the municipal agenda for climate change adaptation planning. Also, framing policy interventions in practical terms of past experiences with ‘focusing events’ in the form of historical storms and damages provides examples of ‘place-based’ contextual, social factors that enable stakeholders to ‘buy in’ to the adaptation policy process. As well, adaptation framing that optimizes opportunities for collaborative regional emergency planning, in combination with collaborative municipal capacity-building and support initiatives from higher levels of government, academia, consultants and non-governmental agencies, can also act as enabling factors for gaining stakeholder ‘buy-in’ to the adaptation policy making process at the local scale.

7.3.2 Adaptation capacity-building: Stakeholder and public engagement, policy formulation and risk prioritization

Supporting staff capacity-building through attendance and participation at municipally-focused meetings, conferences, workshops, and/or webinars on topics of climate change risk and adaptation planning can be a central means for enabling robust adaptation planning via building staff capacities for risk identification and prioritization processes, at the municipal scale. Municipal staff knowledge and input are the key mechanism for the determination of adaptation priorities, and committee round-table

discussions are an influential method for collectively determining adaptation priorities. The ‘Hazard Risk Vulnerability Assessment’ (HRVA) process of ranking and rating adaptation risks offers an example of a mechanism for facilitating the determination of adaptation priorities. Critical infrastructure and public safety concerns raised by increased awareness of hazard proximity through stakeholder capacity-building activities present further opportunities for cross-jurisdictional adaptation planning and policy collaboration in order to address and respond to shared climate change risks and priorities.

7.3.3 Adaptation integration: Political support and the social factors impacting policy integration

Inter-governmental cooperation is required for facilitating the exchange of climate change related data and information that can better enable municipalities to proceed with adaptation planning implementation priorities. There is also a significant applied need for municipal-provincial collaboration and/or clarification of inter-governmental jurisdictional and legal responsibilities between provincial agencies and institutions, and municipalities, in order to facilitate better policy, planning and integrated implementation of adaptation and emergency preparedness plans and strategies at regional and provincial scales.

Integrating climate change considerations into municipal planning processes (work plans, capital plans and projects), and developing and coordinating integrated regional land-use approaches for advancing long-term adaptation and emergency planning priorities through regional emergency measures organizations, and/or through the development of regional ‘champions’, all present further opportunities for adaptation policy entrepreneurship. Capacity building funding for human resources and/or funding for staff capacity-building activities could aid with the integrated implementation of municipal adaptation measures. It seems that having access to capacity-building funding for staff and resources could provide a cost-effective policy option for progressing with the integrated implementation of MCCAP priorities and integrating climate change adaptation at the municipal scale.

In contrast, the current gas tax agreement between the province of Nova Scotia and the federal government of Canada (2014-2024) defines capacity building as ‘investments related to strengthening the ability of municipalities to develop long-term planning practices’. However, the same document specifically *disallows* municipalities from spending designated ‘capacity-building’ funding on salaries for new, internal municipal sustainability and climate change adaptation planners.

The gas tax agreement details how municipalities may use gas tax capacity-building funds for developing and implementing: ‘... studies, strategies, or systems related to asset management, which may include software acquisition and implementation [and] training directly related to asset management planning and, long term infrastructure planning’ in order to ‘strengthen the ability of municipalities to improve local and regional planning, including capital investment plans, integrated community sustainability plans, life-cycle cost assessments, and asset management plans’.

However, *ineligible* expenditures include: ‘... salaries and other employment benefits of any employees of the Ultimate Recipient [municipality], its direct or indirect operating or administrative costs of the Ultimate Recipient [municipality], and more specifically its costs related to planning, engineering, architecture, supervision, management and other activities normally carried out by its staff, except in accordance with eligible categories’ (See Appendix I1: Schedule B, Item 18 and Schedule C, Items 1b, 2c).

Given that the gas tax ‘capacity building’ category explicitly prohibits additional salary expenditures for planners, engineers, architects, supervisors or managers to develop and implement integrated sustainability measures and plans; implicitly, this means that gas tax funds under the capacity building category, if they are spent at all, will be spent on tendered consultancy contracts. While advantageous in some respects for private sector stakeholders, this neo-liberal, out-sourced approach to capacity-building policy making exhibits considerable drawbacks to the integration of adaptation into local governments. Instead of increasing multi-level governance support for facilitated access to finance for funding day-to-day human resource capacity, this example exhibits an unsustainable approach to capacity building that likely will have little lasting benefit for local

stakeholders. As this study has illustrated, constrained municipalities require access to greater financial resources to increase capabilities for addressing the integrated implementation of sustainability and adaptation priorities developed in MCCAPs and ICSPs through increased human resource capacity. Staff expertise is needed to facilitate municipal adaptation integration on a sustained basis through organizational changes to municipal strategies and decision making and through the provision of ‘in house’ expertise to inculcate social values, norms and expectations that are commensurate with enabling municipal adaptation to climate change risks through incremental processes.

This study confirms that municipalities require access to ‘best practices’, frameworks, case studies, including tools and processes, for adaptation policy and planning, including innovative financing options, in light of the provisions of the capacity-building category of the gas tax agreement. With or without gas tax capacity-building funding, in the case of the municipalities of Nova Scotia Canada, there is a clear and present municipal need for reliable access to financial resources to enable knowledge and gain the skills required for making progress on the implementation of climate change risk reduction measures.

7.3.3.1 The will to adapt: Political support for developing and implementing adaptation plans and policies

To reduce climate change risks and increase resilience to climate change impacts in municipalities, political leadership is important, if not instrumental. Political leadership priorities identified in this research include integrating adaptation priorities into capital infrastructure planning and annual budgeting processes, facilitating inter-departmental staff motivation and collaboration on MCCAP priorities implementation (e.g., land-use planning strategic reviews, integrating MCCAP priorities into infrastructure and asset management), providing support for education and awareness-raising initiatives, and broadly engaging in inter-municipal collaboration through regional emergency measures organizations and other agencies to clarify shared responsibilities on integrated climate change risk reduction through infrastructure, emergency and land-use planning. The Nova Scotia case study results indicate that these agenda-items provide key opportunities for cultivating political leadership to facilitate adaptation integration at the local scale.

7.4 MCCAP in a wider multi-level governance context

MCCAP evidence in comparison to Corfee-Morlot et al., (2009) suggests that adaptation policy making occurring at local, regional-horizontal scales and vertical multi-level governance scales requires institutional coordination to overcome institutional fragmentation by clarifying jurisdictional authority and responsibility for adaptation implementation, and, commensurately aligning and coordinating multi-level adaptation policy agendas and distribution of resources to address municipal adaptation priorities, such as those identified in this case study (Horak, 2012).

There are key roles for political leadership across scales, and this social impact factor plays important roles for the implementation of climate change risk reduction measures at the local scale. Achieving ‘good’ multi-level adaptation governance also requires multi-level governance leadership to provide lower orders of government with the tools they require to have the skills necessary to make use of climate change information and act on implementation priorities. In the case of the MCCAP, ‘soft-path’ adaptation through institutional capacity enabled by greater staff, resources and funding suggests a cost-effective and efficient way for normalizing adaptation in municipal decision-making to contribute to the cross-scale deliverance and coherence of larger climate change objectives related to reducing emissions and implementing adaptation through climate risk reduction measures in Canada. The soft path approach may contribute to overcoming the long-term uncertainties by incrementally addressing climate change through regulatory reform and the institutionalization of adaptive practices in municipal government decision-making processes. This topic is deserving of greater scholarly research and analysis.

Corfee Morlot et al., discuss how conceptual ‘good practices’ can be used to conduct *evaluations* of multi-level climate change governance. These principles and practices are now conceptually considered in the exploratory, descriptive analysis of the MCCAP in Nova Scotia. Nova Scotia’s MCCAP provides evidence that the level of inclusion of public participation required for municipal adaptation planning can be mandated by higher government; and that there are social considerations related to the contextual policy-making landscape that should be considered when crafting multi-level adaptation

governance frameworks (e.g., purpose of public participation, levels of existing knowledge and information and socio-cultural norms of climate change awareness as an environmental hazard). Multi-level governance capacity-building resources (e.g., MCCAP guidebook, capacity-support) can provide a strong analytic foundation to guide decision-makers' planning and this can be contributive to maximizing cost-effective and economically efficient adaptation planning at the local scale (Jones, 2012). The MCCAP encouraged experimental policy innovation and the social patterns, similarities, differences and contrasts documented in this study provide a rich, thick description of multi-level adaptation governance and the social landscape underlying it (Baxter and Eyles, 1997). The key barriers that were identified in this study relate to inequities in resource distribution and procedural aspects of governance. Institutional fragmentation, lack of leadership and lack of resources may undermine municipalities institutional adaptive capacities for establishing long term climate change risk reduction planning horizon. Ultimately, this impedes multi-level policy coherence and the potential for using multi-level governance mechanisms to encourage municipal actions, monitoring, reporting and evaluation as elements of integrated adaptation policy practice in a multi-level governance context to achieve common climate change policy goals.

7.5 Future research directions

The MCCAP case study finds complementarity with the Sustainable Canada Dialogues (SCD) publication 'Acting on Climate Change: Solutions from Canadian Scholars' (2015:8) that mobilized over 60 Canadian climate change scholars to develop science-based, viable approaches to climate change risks by proposing 'policy orientations designed to deliver viable, large impacts based on [scholarly] expertise'. Section 3.4, entitled 'Building resilient governance for sustainability', discusses 'effective climate change governance in Canada' concluding that: 'Effective climate change governance is not simply a matter of information provision: ambitious targets and actions, developed through a participatory process that engages a wide swathe of actors, integration with other policy domains, and frequent opportunities for course-correction, are all required' (SCD, 2015:49).

The SCD study offers parallel affirmations of the MCCAP case study findings. For example, as Nova Scotia's MCCAP experience demonstrated, having access and the skills and abilities to make use of climate change information through collaborations with external stakeholders (e.g., government, academia, boundary organizations), adds legitimacy and perceived fairness to the imposition of incentive-based multi-level governance policy approaches that target the mobilization of social capacities to address the integrative issues associated with climate change risks and adaptation. The MCCAP case study also offers an important example of an adaptation policy making process that initiated a 'values shift in responding to climate change' through enabling planning processes that led to the articulation of preliminary policies and plans to address local-scale climate change risks, while recognizing municipal, regional and provincial barriers and opportunities for action. The MCCAP case study empirically demonstrates how and why there are multiple and outstanding barriers and constraints that continue to challenge climate change policy coherence, congruence and the implementation of adaptation measures across governance scales in Canada.

Future research to compare and contrast the MCCAP case study documenting Nova Scotia's approach and experience with adaptation policy development to other jurisdictions in Canada, and elsewhere, presents opportunities for furthering the knowledge, theory and practice of adaptation planning and policy making. Several key research themes emerged from this research based in Nova Scotia, Canada that present future opportunities for comparative case study research and investigation in other jurisdictions. Specific opportunities for future research include:

- Cases of adaptive capacity-building policy mechanisms and funding options for local governance to invest in 'soft-path' adaptation (e.g., staff and training) (Porter et al., 2015; Krause, 2012; Roberts, 2010)
- Adaptation case studies documenting inter-governmental clarification processes to determine appropriate legal responsibilities and policy jurisdictions for addressing the mitigation of local climate change risks (Dany et al., 2015)
- Cases of adaptation planning conducted as an open public process and/or publicly driven agenda, in contrast to the MCCAP case studies (Cloutier et al., 2015)

- Case study examples of strategic, collaborative regional coastal zone adaptive land-use policy making efforts using planning visualization tools (O'Neill et al., 2014)

Further geographical opportunities exist for specifically developing integrated regional land-use and emergency planning maps and models based on MCCAP outputs. Developing mapping applications for utilization in future iterations of facilitated, collaborative HRVA processes could utilize planning visualization models and scenarios to advance integrated disaster risk reduction (e.g., flood elevation and water resource management planning; land-use and emergency planning) through innovative partnerships and collaborative opportunities for academic-municipal technology development and transfer (Olhoff, 2015; Manuel et al., 2015).

7.6 Conclusion

This research has developed a thematic, functional conceptual framework for research into climate change adaptation at the scale of municipal governments in multi-level adaptation governance context. The research produced policy applicable results to further enable the improvement and development of municipal adaptation policy making and planning practices through multi-level governance and collaborative approaches to capacity-building to surpass multi-level governance impediments obstructing municipal vulnerability reduction (Burton, 2009). It is recommended that the capacity-building category of the Nova Scotia-Canada gas tax agreement should be amended to allow municipalities the opportunity to hire staff to implement sustainability and adaptation plans (Appendix II).

The research framework has contributed to adaptation concept development, knowledge accumulation, and the translation and mobilization of knowledge to enable conditions and reduce barriers to local scale adaptation policy and planning. Findings illustrate the social impacts of key adaptive capacity levers such as: the skills to make use of information; the importance of staff champions and related staff resource capacity and availability; and the social benefits of enabling incentive-based adaptation policy architecture. Overall, the study has revealed the importance of these adaptive capacity levers as crucial elements

that can contribute to adaptation integration in municipal staff and council's social values, norms, expectations and decision making processes. Nova Scotia's MCCAP provides an important example of an effective adaptation policy framework for incentivizing and initiating local planning processes to addresses issues of climate change risk and adaptation at the municipal scale, while also illustrating many of the multi-level governance institutional and structural barriers and constraints to adaptation policy coordination in other jurisdictions (Horak, 2012).

Integrating and transforming institutions for adaptation and sustainability through multi-level governance face multiple challenges that transcend scales and confront social structural limitations (Görg and Rauschmayer, 2009). Innovative policy approaches that can enable municipal climate change adaptation illustrate substantive opportunities for improving the ability of different levels of governments to minimize current and future climate change risks and hazards through collaborative approaches that prioritize climate change planning and adaptive capacity-building at the local scale. However, overcoming institutional constraints and barriers to adaptation may require a shift in values towards new conceptualizations of risk and uncertainty within the context of local adaptation land use planning and decision making, including confronting the social limits to adaptation posed by broader structural contexts of politics, institutions and multi-level governance (Adger et al., 2009). Modifying existing approaches to multi-level governance for climate change adaptation may require transformational changes to institutional hierarchies and funding mechanisms (Manuel-Navarrete and Pelling, 2015; Pelling, 2011). Beyond the matter of planning, there is the matter of capacity and this can often be impeded by the limited resources available at the municipal scale to deal with the range of challenges and priorities arising due to climate change. Bridging gaps between academia and society through applied research approaches present new opportunities for further mobilizing and integrating transformative implementation processes (Burch et al., 2014) within the context of the unprecedented socio-ecological challenges associated with planning for climate change risks in the 21st century (Kopits et al., 2014; Wheeler, 2011).

In sum, Nova Scotia's adaptation planning process provides an invaluable example of a multi-level governance incentive structure and capacity-building approach to effectively instigate and enable municipalities to identify and prioritize contextual, local scale risks associated with climate change. This dissertation examining the MCCAP case study documents an important multi-level adaptation governance example, contributing to the advancement of both adaptation policy and planning concepts and theory while advancing adaptation case study research methods more broadly. By documenting the multi-level adaptation governance policy making conditions and social factors that impacted Nova Scotia municipalities with planning for climate change adaptation in Nova Scotia, this study contributes both conceptual and pragmatic insights into how multi-level adaptation governance can more effectively enable local adaptation to the potential risks and hazards associated with adapting to a changing global climate in the 21st century.

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Appendices

Appendix A1: Case study research design and justification

This Appendix expands on Chapter Two to provide further methodological justifications for the research approach employed in this PhD study. While early criticisms of case study methods deemed the approach as unscientific, as replication was not possible, Yin (1994) contended that the provision of an overview of the project, the field procedures, the case study questions and the guide for reporting constituted further means for increasing reliability via the articulation of the research design protocol. This appendix provides such clarifications. After Yin, the four stage model of case study includes: i) design, ii) conduct, iii) analysis and; iv) the development of conclusions, recommendations and implications in the reporting guide.

Design

Exploratory, descriptive case study research seeks to provide, to the greatest extent possible, meaningfully objective ways and methods of synthesizing large volumes of qualitative data to produce findings that explain social phenomenon through the identification of contrasting patterns, similarities' and differences using data comparisons to illustrate social phenomenon both within and across cases.

Palys advises that considering 'how cases are similar to or different from one another may help attune us to useful explanatory concepts' (1997:300). By concretely conceptualizing similarities and differences through empirical means of comparing and contrasting, cases can also be fortified by incorporating conceptually thematic frameworks and research approaches that contrast empirical observation with broader literatures of research interest.

While the unit of analysis for conducting case study research could invariably be, 'an individual, a community, an organization, a nation state...' (Sjoberg, Williams, Vaughan, 1991); Tellis (1997) advises that 'the unit of analysis is a critical factor... it is typically a system of action rather than an individual or group of individuals... [case studies are] selective, focusing on one or two issues that are fundamental to understanding the system being examined'. This study focuses on an illustration of the social factors impacting, enabling and constraining municipal adaptation stakeholders in broader multi-level governance contexts.

Orum (2001) has defined a case as a singular phenomenon, whereas Bennett (2001) expanded the definition of a case to include within case analysis of single cases and comparisons between or among a small number of cases (in Perecman and Curran, 2006:21). These scholars both agree that case study research approaches require the utilization of a diversity of data collection and analysis strategies; and that advancing broader theoretical agendas through case studies requires clearly demarcating the unit of analysis in order to answer the question, "what is this case, a case of" (citing Ragin and Becker, 1992).

After Palys, this study utilized within case analyses of provincially aggregated data produced via content analysis, focus groups and iterative testing using an online survey, to further explore and describe impactful social factors using in depth, across individual case analysis of three purposively selected municipalities' MCCAP policy-making processes in the case of Nova Scotia multi-level adaptation governance. The objective of illustrating observable patterns, similarities and differences of municipal adaptation policy-making approaches at the individual -case level using prioritized opinion trends about social impact factors to narrow the illustrative scope of across individual -case analysis. This empirical work is further contrasted using the conceptual

framework to externally discuss findings in relation to literature, thus offering a model of a robust case study research design for both conceptually and empirically exploring and describing the multi-level governance of municipal adaptation, based on the contextual case study of the MCCAP multi-level governance framework pioneered in Nova Scotia, Canada.

Descriptive theory building in this study has proposed that, based on a deductive analysis of the preceding discussion related to contemporary research literatures on climate change adaptation planning and policy-making in multi-level governance contexts, there are three useful conceptual categories of interest to within and across individual -analysis of municipal adaptation policy-making processes: adaptation policy-making initiation, municipal adaptive capacity-building and municipal adaptation policy integration.

Conduct

Preparing to conduct a descriptive and exploratory case study of the MCCAP in Nova Scotia necessitated the articulation of a research approach for within-case descriptive study and analysis of individual cases of municipalities tasked with the completion of the MCCAP, required constructing a thematic functional conceptual framework for analyzing multi-level adaptation governance. This was geared at attaining the research objective of ascertaining the social impacts of factors affecting the initiation, capacity-building and integration processes associated with the MCCAP policy mandate. Based on the literature, three conceptual propositions were developed and discussed using the sub-thematic functional policy questions that were crafted to guide case study inquiry.

Orum and Bennett agree that conducting case studies is not without controversy and critics will point to issues of conceptual formation and inferred causality as subjects of researcher bias. However, it is arguable that answering the question ‘what is this case, a case of’ requires moving beyond standard statistical derivation approaches to invoke new qualitative research methods and concepts that test propositions in order to advance social scientific theory, research methods and societal applications. By utilizing well-constructed case study research designs and functional policy questions to drive qualitative data collection and analyses capable of exploring, describing and producing preliminary quantitative indicators about social impact factors of importance, case study research can serve as a useful means for providing applied insights into the who, what, how and why of social phenomenon, and the similarities and differences occurring within and between small numbers of cases (Schrack in Perecman and Curran, 2006).

The study design utilized in the case study analysis of the MCCAP policy-making and multi-level adaptation governance process in Nova Scotia, jointly considered aggregated Provincial trends, descriptively represented by iteratively testing findings generated in focus groups and online surveying to produce quantifiable indices to prioritize impactful social factors of research importance for illustrative depth contextualization in three individual municipalities’ MCCAP processes. While this approach may lack the explanatory rigor of a time-series analysis (e.g., Porter et al., 2015), or larger sample size (Hanna et al., 2014); the MCCAP case study research approach provides an operable means of synthesizing case study findings broadly under three conceptual themes of adaptation policy initiation, capacity-building and integration, and the more explicitly and analytically described functional policy-making sub-themes discussed in Chapter Three (Vogel and Henstra, 2015).

The goal of developing this qualitative research approach was to contribute to developing useful methods for drawing analytic generalizations about multi-level adaptation governance by utilizing the three conceptual propositions as rubric for exploring and thematically describing policy-

making functions and important social factors related to the policy-making processes that led to the production of MCCAPs in Nova Scotia. This case study approach also aligns with Stake (1995) who described that developing means for intuitive, empirically grounded generalization provides scholarly opportunities to communicate experiential observations to facilitate greater understandings of social phenomena, such as the complexities of municipal adaptation in multi-level governance contexts.

Data triangulation using direct participant observation via focus groups, interviews and an online survey provided research opportunities for analyzing and synthesizing a breadth and depth of contextual data related to social impact factors affecting the MCCAP process in order to determine the MCCAP impacts on municipalities and the enabling and constraining factors affecting municipal adaptation planning and policy development and implementation in municipalities. MCCAP texts were also subjected to latent and quasi-manifest content analysis utilizing a constructed guide in order to determine emergent patterns (Appendices B1-B4).

While this triangulated data collection research approach contributes to internal validity (Yin, 1994; Yin, 1984), place-based case contexts' broader applicability to external theory development remains contested (Tellis, 1997). However, specification of the unit of analysis can contribute to fortifying the internal validity, and, in this regard, the value of describing and exploring the nascent example of Nova Scotia's MCCAP multi-level adaptation governance case plausibly contributes to broader literatures of adaptation case studies and the further development of comparative methods for adaptation policy analysis using case studies. This exploratory, descriptive study also discusses the MCCAP evidence in relation to existing conceptual knowledge. Achieving external validity required cross comparison with existing theoretical knowledge. Robust theory building is arguably more difficult to achieve, however, exploring conceptual propositions using descriptive policy making functions provided a means for contrasting thick, rich descriptions of the Nova Scotia MCCAP in relation to existing literatures (Baxter and Eyles, 1997).

Further, offering detailed documentation of the case study protocol provides further indices of reliability when conducting within case and across-case study analysis. In this regard, articulation of the research conduct and the provision of detailed appendices are offered throughout this dissertation in an attempt to gain greater scholarly reliability in what is ostensibly and admittedly a non-conformist and unorthodox approach to obliquely researching an obscure and nuanced topic using empirically grounded and applied social science research conducts and protocols.

Analysis

Answering the 'what' and 'how' questions related to the MCCAP in Nova Scotia through exploratory research offered a contemporary opportunity (Levy, 1988) for developing and contributing to applied knowledge of adaptation policy-making in multi-level governance contexts.

Yin's (1994) applications of case study analyses includes providing explanations of complex causal linkages in real-life interventions, describing real-life contexts in which interventions occur, describing interventions, and exploring situational interventions where there is no clear set of outcomes. The MCCAP case meets all of the criteria for conducting a case study given that it is addressing a contemporarily salient topic (local adaptation) within a complex multi-level adaptation governance framework (MCCAP). The MCCAP is justifiably deserving of description and exploration of its process related outcomes. Given the paucity of multi-level adaptation governance frameworks in Canada, and elsewhere, descriptive, exploratory case study analyses of

the Nova Scotia MCCAP adaptation policy making process warrants further attention for its conceptual and applied research value contributive to advancing adaptation case studies investigating multi-level governance policy-making developments in the distinct policy research field of climate change adaptation.

Exploring, describing, illustrating and analyzing the ‘how and what’ reasons for adaptation planning and policy-making processes in Nova Scotia municipalities is based on the analysis of data collected in focus groups, interviews an online survey and the content analyses of MCCAP documents. Examining, categorizing, tabulating and recombining evidence to address theoretical propositions constitutes a robust approach for synthesizing case study data (Yin, 1994). Tellis (1997) advises that reliance on existing topical literatures and researchers’ knowledge and experience to present evidence in various ways, utilizing various interpretations, can lend itself to producing ‘unbiased’ results.

A general analytic strategy (Yin, 1994) that involves ‘pattern-matching’ (Yin, 1984) offers an approach for case studies seeking to advance theoretical propositions. Trochim (1989) also considered that internal reliability was achievable through descriptive theory interpretatively matching empirical evidence as a desirable strategy for case study analyses.

Reporting Guide (See Appendix A2)

The reporting guide for this study combines the three conceptual propositions and eleven sub-thematic heuristic devices as an operable thematic, functional conceptual research framework and rubric for exploring and describing the Nova Scotia MCCAP process using within and across-case analysis of primary data gathered via focus groups, interviews and an online survey; with complementary content analyses of the MCCAP plans and provincial MCCAP policy document. Further discussion incorporating the conceptual propositions and sub-thematic functional policy areas of inquiry add a means of contributing to the external validity of the MCCAP case study in broader contexts of adaptation case studies and literatures. The conceptual themes and functional policy questions used in this case study provide descriptive opportunities for advancing both adaptation theory and comparative case study methods by constructing means and ways for quantitatively and qualitatively comparing and contrasting the MCCAP with existing literatures on municipal adaptation policy and planning practices in order to illustrate similarities and differences within and across cases.

A broader applied goal of this methodological work is to contribute to forwarding adaptation policy, practice and theory development via the testing of multi-level adaptation governance conceptual propositions in the unique case study research context of Nova Scotia, Canada. Further making contributions to the development of rigorous comparative adaptation case study methods via the utilization of sub-thematic heuristic research devices offers continued research opportunities for modifying and advancing adaptation case study through research design replications that may, in time, more broadly determine the utility and veracity of the conceptual framework in other contexts, further allowing for iterative modification and refinement of the conceptual propositions based on more broad-based adaptation case studies and research methods improvements to provide functional policy insights gleaned from other comparative cases of multi-level adaptation governance contexts. Please see Chapter Seven for findings synthesis, recommendations and conclusions based on this exploratory, descriptive PhD case study analysis of municipal adaptation planning and policy development in Nova Scotia, Canada.

Content analysis

Tellis (1997) advises that documentary content analyses suffers from the weaknesses of bias selectivity while texts reflect a reporting biases and should not to be construed with the unmitigated truth. However, the replicability, unobtrusive and exact nature of content analyses of texts fortifies its utility for social science researchers as method of background research to contextualize case environments. However, further research issues associated with access to retrieving documents problematize content analysis as a replicable method.

This research study secured free access to the complete and public MCCAP data set via the Nova Scotia Department of Municipal Affairs, responsible for the implementation of the MCCAP mandate and municipalities' reporting of MCCAP documents. The MCCAP data set was then preliminarily subjected to a latent 'meta' content analyses using NVivo and a content analyses guide (Appendices B2) to beta-test and to determine the thematic-functional approach's applicability as a means of text-coding the plans and in order to assess and determine patterns, similarities and differences across MCCAP plans. During this activity, an emergent and partially manifest coding strategy was also experimentally employed to generate content themes (See: Appendix B1).

Focus groups and interviews

Tellis (1997) cautions that focused, semi-structured interviews and focus groups suffer from weaknesses related to researcher bias in the form of undue and reflexive influence on respondents in questioning or focus group formats, issues that can be further problematized by incomplete recollections of respondents and the subsequent 'subjective' extrapolation of meaning by researchers. However, targeted research audiences can also provide process-oriented insights not observable in the content of texts, while gaining human perceptions about causal inferences and the 'real-time' nature of events in constructed realities and social contexts. This provides contextual depth to breadth research approaches.

The use of an interview protocol for conducting across individual case analysis of several interviewees' responses is another means by which to reduce research bias and increase the reliability of research results and aid analytic inference of meaning making across cases. In focus groups, the role of 'researcher as facilitator' requires careful attention to minimize active participation so as not to skew focus group participation (Tellis, 1997). Given the ethical dimensions of the PhD research, institutional oversight and ethics approval was required in order to conduct non-medical research with human participants in this case study. Please see ethics approval for this study in Appendices C1 and C2.

As per the ethically approved research protocol, all focus group and interview participants were provided letters of information in advance (Appendix E1 & F1) and signed waiver forms that indicated research participants consented to freely and anonymously participating in the PhD research study. This confidential research approach targeted the collection of insights from a diversity of municipal adaptation stakeholders and those involved in the MCCAP policy mandate, in order to gain a diversity of stakeholder perceptions and opinions to inform case study analyses at the provincial scale and in individual municipal cases. With MEOPAR partnership funding and in-kind support from Nova Scotia research partners, field research was conducted over two weeks in the fall of 2014 in the four purposively targeted case sites.

The MCCAP policy mandate required the completion of the MCCAP plans by January 2014; ostensibly indicating that the shared perspectives and perceptions of focus group and interview

research participants related to the social factors impacting the MCCAP policy-making were reasonably current and contemporaneously applicable for case study analyses. It is also notable that the ten interviews conducted to guide subsequent across-analysis at the case level reasonably aligned with and reflected both the demographics of MCCAP committee structures (two planners, one emergency measures coordinator, one manager, one mayor, one councilor) and stakeholders collaboration demographics (one provincial policy maker, two consultants, one NGO representative) identified via content analyses of a representative sample of MCCAP plans (See Figure 3).

Appendices E2 and F2 (Focus group protocol & Interview protocol) and Appendix F3 (Individual case profiles) provide further and more detailed descriptions of the focus group protocol and research methods used to guide field research in the selected case sites. Chapters 4, 5 and 6 provide further details relating the research conduct and procedures that were utilized to conduct interviews and focus groups in Nova Scotia, Canada. Chapters 5 and 6 more specifically detail the analytic strategy for individual case analysis of interview data using prioritized opinion trends about social impact factors determined in the iterative online survey as a pragmatic means for narrowing the research scope of interview data and individual case analysis.

In-kind, arms-length research partners in this study included: the Nova Scotia Department of Municipal Affairs, the Nova Scotia Planning Directors Association and the Union of Nova Scotia Municipalities who assisted and contributed to the recruitment of research participants via mass email list-serves and the provision of MCCAP related data including MCCAP documents, as well as further support with gaining access to MCCAP adaptation stakeholders targeted for research participation.

Online survey

Online surveys can be notoriously unreliable for their self-selecting bias and thus in this study was *solely* selected as targeted research method to serve *only* as a iterative, secondary and supplementary data collection tool and screening mechanism for conducting more in depth across individual case analysis of MCCAP processes in three purposively selected municipalities. The researchers' collaborative perspective was that the iterative online survey provided a useful method for the re-testing of previous data, as online surveys offer a time-efficient and cost-effective research vehicle for overcoming geographic and logistical constraints. The online surveys' capacity to efficiently, iteratively quantify qualitative data by collecting large volumes of data to prioritize findings about social impact factors of priority interest was very useful. Otherwise, logistical, geographic and financial and time constraints of the study limited the PhD researchers' capacities for more direct, interactive, iterative post-engagement with case study stakeholders and research participants in the field, in Nova Scotia. The online survey provided an effective and efficient method for re-testing and iteratively quasi-verifying previously gathered findings.

In this case study, the online survey was crafted and informed mainly by the findings and previous results produced in focus groups, but also with insights drawn from content analysis (Appendix G2: Regional priorities) and interviews with adaptation stakeholders conducted in Nova Scotia. The prioritized trends about social factors impacting municipal adaptation planning and policy-making that were generated in the online survey, subsequently served as an integral screening tool to narrow the scope of research for conducting an exploratory, descriptive and illustrative across-case analysis of three purposively selected municipalities' MCCAP policy and planning processes.

Noting the implicit self-selection bias' issues inherent in open formats of online surveying, a mass recruitment email was specifically developed and distributed at monthly intervals via a Nova Scotia municipal planning directors' list-serve, in order to recruit the targeted demographic of municipal adaptation stakeholders for research participation (Appendix G1). To also ensure ethical conduct was upheld, the director of the NSPDA, a representative from the UNSM and PhD committee members, reviewed the survey in advance of its launch. Further recruitment using previously developed focus group email lists were also utilized to marshal research participants. The online survey was available for two months in 2015 and, to ensure equitable opportunity for participation, respondents were provided with the option of printing and mailing PDF copies of the survey if online completion was not possible. Despite this provision, all responses were gathered via the online survey.

On May 25, 2015 the survey was made available online via paid access at [surveymonkey.com](https://www.surveymonkey.com), and for two months survey participants were able to participate in the 30 to 40 minute, 34 question survey inquiring about the various social factors and conditions that enable and constrain municipal adaptation (Appendix G2 providing background content analysis of the regional priorities surveyed for broader relevance in Q22 of the survey). The survey was closed on July 25, 2015 and subsequently survey data was compiled in excel spreadsheets for further analyses and syntheses to discover findings worthy of further depth investigation and contextual depth illustration in individual case analysis across three municipalities, with external voice provided by non-municipal stakeholders (See Appendix G3 and G4). As noted, the survey results integrally informed across individual case analysis of interview texts already pre-collated and pre-categorized according to functional policy themes for further analyses using comparative tables and memo-taking to illustratively describe and explore adaptation policy and planning at the case level in order to produce findings.

Based on this participant recruitment process the online survey garnered the participation of 26 respondents from 19 municipalities, spatially representing 36% of all Nova Scotian municipalities. Demographically, 20 of the online survey respondents participated representing a staff perspective. The targeted majority of these participants were professionals from municipal planning and development occupations (14). Three municipal chief administrative officers, one engineer, one economic development officer and one emergency management official also participated in the online survey. Staff survey participants had an average of 11 years of municipal employment experience, while six survey participants represented a municipal council perspective, with an average of four years of municipal governance experience.

Of a potential 26 respondents, the cumulative average response rate in the survey was 20 participants. It is noted that respondent attrition within the survey may have related to the amount of time involved and the level of detail contained in the 34 question survey, as participation rates were noted to fall in relationship to the progression of questions in the survey (22 to 19). Survey questions were categorically segregated and consisted of a combination of narrative descriptions aimed at assessing respondents' levels of agreement/disagreement, as well as questions using factorial ranking and ratings to assess municipal perspectives on issues of relative importance, including through the use of numerical scales, as well as check boxes to collect responses (see Appendix G3). For the purposes of expediting across individual case analysis, survey comments were not included in the analytic strategy for this study to determine social factors impacting municipal adaptation efforts in Nova Scotia.

Ten new municipalities that were not represented in the focus groups were represented in the online survey results, indicating that nine municipalities were doubly represented in both the focus group and survey findings. However, five municipalities represented in the focus groups,

were not represented in the online survey. The relatively even spread of stakeholders from new (n=10) municipalities' and repeat (n=9) municipalities' who participated in the online survey adds a degree of validity to the survey findings. The representative survey opinions of participants either iteratively built on opinions expressed in focus group findings (47%) or added a new municipal perspective to previously gathered focus group findings (53%). Online survey results provided a method for testing municipal stakeholders perspectives based on a reasonably representative aggregate sample of municipalities' opinions.

While this screening approach is acknowledged to be lacking in statistical validity and reliability associated with larger sample sizes (e.g., Hanna et al., 2014), the applied purpose for adopting this mixed methods research approach was to leverage the more broadly representative quantitative results from the breadth of survey data as a means of narrowing the scope of individual case analysis about the 'important' social factors worthy of further narrative illustration at the case level. Based on PhD committee advice supporting this research decision, the within MCCAP case research approach was used to further individual case analysis of the significant survey findings across three purposively selected municipalities, provided an approach for illustratively describing and exploring the social factors related to how the variability of conditions impacting adaptation planning and policy making processes at the municipal scale occur. Thus, based on this justification for the determination and narrowed scope of prioritized opinion trends about MCCAP social impact factors, further investigative exploration and description was enabled to 'roam the eastern frontiers' of adaptation policy and planning research using within MCCAP individual case study analysis.

Justification

Palys (1997) concedes that 'the ad hoc aspects of the qualitative research decision-making process make it more difficult to describe how to do well' and accounts of how and why qualitative research decisions are made are seldom disclosed by researchers (1997:297). Thus the 'art' of conducting qualitative research has been further criticized based on the lack of a clear set of criteria through which to evaluate the adequacy of qualitative research, due to the fact that researchers seldomly disclose the motivations for research design choices. However, Palys upholds that conducting iterative research (cyclical approaches to data collection and analysis) can occur successively in what Huberman and Miles (1994) have described as the 'loose' case study design, applicable to unfamiliar or complex cases where the research aims are exploratory and descriptive. This research adheres to this Huberman and Miles approach, bounding the scope of the study to an exploration and description of the Nova Scotia MCCAP policy and planning process at inter-related provincial and municipal scales, in order to document and contribute to advancing conceptual and applied knowledge of adaptation policy-making practices in broader contexts of multi-level governance.

Tellis (1997) contends that while case study methods have been subjected to scrutiny and criticism, and not always been a dominant choice for social science research, case studies can and do provide a reliable methodology when executed with appropriate care. Holistic, in-depth investigations (Feagin, Orum and Sjoberg, 1991) of social phenomena using robust research procedures involving the compilation of statistical and anecdotal evidence and across case analysis, including detailed documentation of data collection methods, can produce research results that represent participants' viewpoints through the utilization of multiple sources of data from which to draw theoretical interpretations based on empirical data and observations of cases. Since multi-level adaptation governance municipal climate change adaptation policy-making in Canada (and more broadly) is still in its infancy, exploratory, descriptive case studies provide an opportunity to, in a sense, 'vanguard' the development of experimental case study research

methods as a prelude to more scientific research approaches. This research sought to bridge the lacuna between theory and practice in the real-time research and policy-making nexus of social causation and the conditions that enable local adaptation in the context of multi-level climate change adaptation governance (e.g., Nova Scotia MCCAP). Furthermore, it is well-established in the climate change adaptation literature that comparing adaptation policy-making processes between cases is problematized by the lack of homogeneity in instigating, enabling factors or conditions that lead to the ‘emergence’ of adaptation policy-making and planning, particularly at the local scale (Porter et al., 2015; Baynham and Stevens, 2014; Dupuis and Biesbroek, 2013). Therefore, developing new research approaches, particularly in novel case environments such as the Nova Scotia MCCAP, is reasonably deemed to be an appropriate research choice that is contributive to the advancement of adaptation concepts and empirical understandings of social processes of adaptation governance. This research attempts to incrementally contribute to filling existing gaps in knowledge, research methods, adaptation concepts based on documenting and analyzing practices of multi-level adaptation governance to determine impactful social factors affecting adaptation initiation, capacity-building and integration.

Realistically and critically probing the depths of ‘unseen social forces’ (Sayer, 2000) required developing breadth and depth methods capable of illuminating impactful social factors contributive to contextual case variation in the MCCAP policy actions taken by Nova Scotia, as well as the contrasts in MCCAP planning processes of municipalities. This ontological foundation creates greater research flexibility for exploring and describing the social factors impacting the opportunities and constraints adaptation stakeholders face in making decision-making choices. This research offers scholarly interpretations of the patterns, similarities and differences that underlying the emergent social phenomenon of multi-level adaptation governance, using the MCCAP process for illustrating the social factors impacting municipalities.

Despite breadth research approaches capacity for illustrating statistical homogeneities and the presumed similarities identified across cases (Schrack in Perecman and Curran, 2006), this study developed an alternative, qualitative research design for identifying social factors that contribute to or detract from municipal adaptation policy-making in multi-level governance contexts. This PhD case study leverages the MCCAP as a unique window of research opportunity for advancing case based adaptation research, via an exploration and description of the impactful social factors worthy of continued conceptual development and empirical inquiry in future comparative adaptation studies.

Case study analysis offers exploratory opportunities for documenting preliminarily observed phenomenon through targeted, purposive sampling approaches. In this case, the targeted demographic was municipal adaptation stakeholders, and specifically those actors directly involved in the development of MCCAP policies and plans. Flexible and open-ended research instruments (interviews, surveys, oral histories, observation, ethnography, archival and other unobtrusive methods) are typically utilized in case study analysis research designs (Palys, 1997). This study selected focus groups, interviews and an iterative online survey as the primary data collection and analyses methods for detailed exploratory descriptive case study of municipal climate change adaptation in a multi-level governance context. Latent and quasi-manifest content analyses of MCCAP documents also served as secondary data analytic strategies prefacing primary data collection and complimentary across case analysis. Further descriptions of these methods are offered subsequently.

Appendix A2: Thematic Functional Conceptual Framework

Conceptual theme & proposition	Comparative objects for adaptation policy analysis	Functional policy questions
INITIATION: Adaptation policy initiation through multi-level governance can act as a critical pre-condition for the initiation of adaptation policies and plans in municipalities.	Goals	What does the adaptation policy/plan aim to achieve?
	Targets	Whose behavior is targeted by the adaptation policy/plan?
	Instruments	What tools are selected to achieve adaptation objectives?
	Agents	Who is allocated responsibilities to implement the adaptation policy/plan?
	Setting the agenda	How did adaptation policy/planning arise on the agenda?
	Framing the problem	How is the adaptation policy/planning problem framed?
CAPACITY-BUILDING: The provision of capacity-building resources through multi-level governance can serve as a key factor for enabling and supporting municipalities' tasked with adaptation policy and planning.	Engaging stakeholders and the public	How are they engaged in the adaptation policy making and planning process?
	Setting adaptation priorities	Is there an explanation of the way in which priorities are set? How does it vary across cases?
	Formulating policy options	How were adaptation planning and policy options formulated?
INTEGRATION: Adaptation policy and planning implementation in municipalities can be enabled via both the conditional and sustained provision of capacity-building resources, provided through multi-level governance approaches.	Generating political support	Was political support important to adaptation policy development?
	Policy integration	In what ways were the adaptation planning and policy objectives integrated into other municipal activities?

Appendix B1: MCCAP Content Analysis

Sampling Strategy

36 of a possible 51 MCCAPs were sampled in this case study, representing a spatial coverage of 70.6% of possible Nova Scotia municipal adaptation plans (n=53 Nova Scotia municipalities). The aggregate sample characteristics included four regional plans collaboratively prepared by 12 municipalities, while 24 standalone MCCAPs were prepared internally and/or in collaboration with private sector consultants, academia or other stakeholders.

In the four regions selected for conducting subsequent focus groups, a sub-selection of regional MCCAPs (n=22) was further analyzed to primarily familiarize the researcher with the MCCAP issues of interest, and to produce descriptive statistical attributes and tables based on a representative sample of MCCAP documents.

Results

Regional analyses of the MCCAP committee structures and collaborations mentioned in the MCCAP plans was specifically conducted to analyze and to describe the ‘who’ and ‘what’ dimensions of the MCCAP multi-level adaptation governance context. This approach was useful for informing subsequent purposive and targeted focus group and interview participants’ recruitment.

Background findings: Regional content analyses

Targeted content analyses of MCCAP committee structures in 22 municipalities of the four regions selected for focus groups revealed that the average size of MCCAP committees was eight to nine people, with a wide array of structures and collaborations identified. Patterns noted included that six of 22 MCCAPs had high-level political representation in the form of a mayor or warden, while four MCCAPs had no political representation. The average percentage of MCCAP committees composed of political representatives was approximately 26.6%, or one quarter of the committee (two members of council averaging per committee). 11 MCCAPs were noted to have been prepared in collaboration with consultants (47.8%) while eight MCCAPs were prepared in collaboration with academics (36.4%). Of the 146 internal committee members enumerated, 37% were from council (54) while 63% of the committees were municipal staff (92). Within the staff sample of MCCAP committees, 25% were enumerated from planning and development (23); 20.7% enumerated from engineering, public works and inspections (19); and 13% enumerated from Chief Administrative Officers or policy director positions (12). A further 15.2% (14) consulting and 15.2% (14) Emergency Management Organization members were also identified as a part of the internal MCCAP committees (see Figure Nine.).

Stakeholder collaborations mentioned in MCCAPs were also enumerated noting that of the 105 collaborations mentioned, 31 were horizontal municipal collaborations (notably six mentions of Emergency Management Organizations and seven mentions of Neighboring Municipalities). A further 27 mentions of vertical provincial collaborations identified nine Department of Natural Resources mentions, seven Department of Environment – Climate Change Directorate mentions and six Transportation and Infrastructure Renewal mentions. A further three mentions were given to the mandating Department of Municipal Affairs. 27 collaborations with academia and public interest groups (17) were noted, while 12 private sector collaborations were also noted; seven of which were with consultancies. Eight vertical collaborations with the federal government were mentioned of which seven noted the federal Department of Fisheries and Oceans as a collaborator. The findings of these preliminary analyses of the MCCAPs’ committee structures and collaborations mentioned in the plans represented a 61% representative of total sample of 36 MCCAP documents included in the content analyses. These content analyses results were primarily used as background information to guide the conduct of field research activities by revealing pertinent evidence of social adaptation planning landscape via descriptively illustrative demographic statistics of the MCCAP planning and policy-making process.

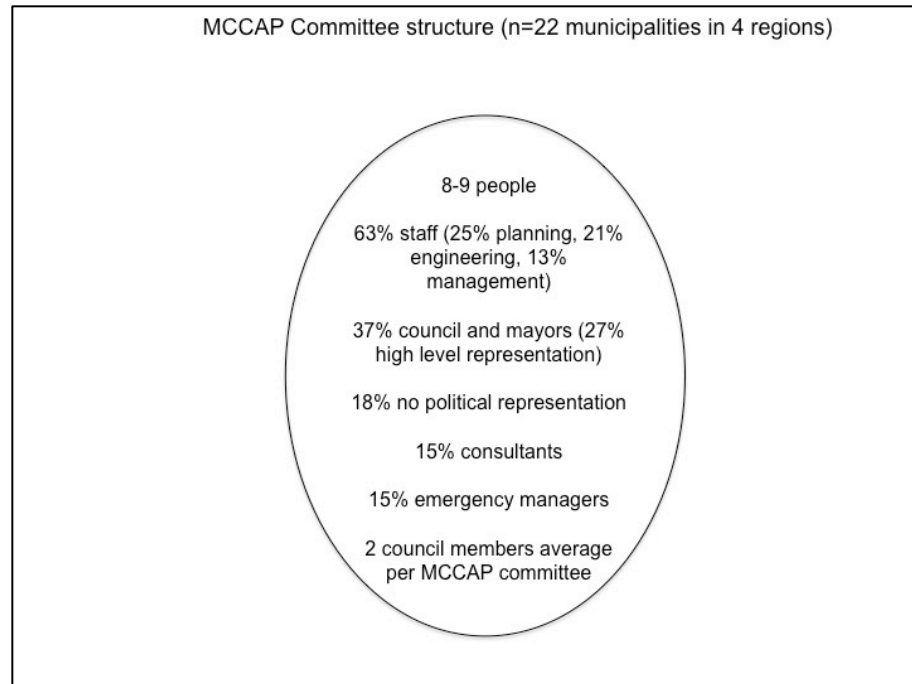


Figure 9: Descriptive, illustrative demographic statistics of MCCAP committee structures based on content analysis of 22 MCCAPs in 4 regions selected for focus groups

Search text queries for key words related to agenda-setting (e.g., ‘Gas Tax’; ‘ICSP’; ‘Integrated’) were also performed in NVivo to determine how widespread mention of the MCCAP gas tax policy mandate was in the MCCAP reports (See Appendix B4 for illustrative findings sample based on one region).

While all municipalities were similarly tasked by the provincial government with the completion of an MCCAP in order to continue to receive Gas Tax funding, the content of the provincially implemented MCCAP policy (the MCCAP guidebook provided to all municipalities: SNSMR, 2011) was separately analyzed through a latent content analysis of the policy mandate to provide additional insight into the contextual policy instructions guiding the production of MCCAP plans (See Appendix B3).

Appendix B2: Content Analysis Guide (*Alpha test version*)

OVERVIEW

Content analysis of MCCAP (municipal climate change action planning) planning documents provides an opportunity for developing a high-level perspective on the MCCAP process based on empirical data.

Utilizing content analysis is a recognized methodology in social science disciplines researching land-use planning and policy, and is notable for its applied utility for planners and policy-makers. Baynham and Stevens (2014) built upon Tang et al., (2010) and Basset and Shandas (2010) in developing an evaluation protocol and methodological approach for this type of planning research. Their recent study considered climate change planning incorporation into official community plans in British Columbia, representing the first such effort to evaluate climate change plan quality in Canada. Four general theme categories (fact-base, goals, policies, inter-governmental coordination / capabilities as a part of implementation) were utilized to comparatively evaluate plans. To allow for categorical cross-comparison and to evaluate quality between plans, Baynham and Stevens used a stepped point system protocol to conduct a comparative assessment between plans (citing: Berke and French 1994, Berke and Conroy 2000, Nelson and French 2002, Brody 2003, Tang et al. 2009, 2010).

The proposed MCCAP meta-analysis will build on this approach by similarly developing key indicators and themes for utilization in NVivo 10.0 to code and analyze MCCAP planning documents. **The objective of this activity is to determine from the whole dataset of MCCAP plans the key trends and themes present across all MCCAPs, as well as notable omissions and/or other attributes and characteristics.** The evaluation protocol and key indicators utilized in Baynham and Stevens (2014) study provide a broad methodological foundation for further developing coding classification and thematic categories for the content analysis. However, this content analysis is concerned with the process of MCCAP preparation as reflected in the content of the MCCAPs, and less concerned with the quality of the MCCAPs. Given that evaluating adaptation plan quality and effectiveness remains problematic due to long-time scales and the uncertainties associated with climate change, the objective at this stage is to generating insights on the process and content of adaptation plans provides opportunities to build and advance theory by generating knowledge of the practice of adaptation planning at the municipal scale.

When complete, the findings of the MCCAP content analysis will provide an empirical basis for undertaking further research exploration in the field. As well, it is anticipated that the findings will provide an opportunity for furthering the conceptual development of the adaptation policy framework, based on a large sample of plans. The findings derived through MCCAP content analysis further provide a foundation for undertaking primary research with municipal adaptation policy and planning stakeholders (land-use planners, emergency planners, mayors, councilors and community stakeholders involved in the production of MCCAP; subject experts).

Content Analysis: Protocol And Methodological Approach

Sample

Nova Scotia is sub-divided into 55 municipal units, each of which was tasked with completing a MCCAP (Municipal Climate Change Action Plan) in order to receive Gas Tax transfer payments administered by the Provincial government. Each municipality was supported in this task with information materials and basic training from Service Nova Scotia and Municipal Relations and the Department of Environment Climate Change Directorate, as well as through various other supporting organizations (Union of Nova Scotia Municipalities, Nova Scotia Planning Directors Association). Municipalities had the option to work collaborative to prepare a 'regional' MCCAP. Three regional MCCAPs were produced as result. In total, 53 MCCAPs form the sample for the MCCAP content analysis.

Protocol

Content analysis utilizing general categories and indicators is a recognized methodology for conducting plan reviews within the literature. This study builds on existing literature adding the notion that municipal climate change adaptation policy is an evolutionary social process, envisaging that adaptation policy development and implementation occurs over time in four distinct policy-making stages: Initiation, Capacity Building, Integration, Transformation (Vogel and Henstra, 2013-14 – *unpublished material*). The ICIT conceptual framework for adaptation policy analysis provides the rubric for content analysis of the MCCAPs.

Content analysis of MCCAPs utilizing the ICIT framework offers an opportunity to bridge the conceptual/empirical lacuna in adaptation theory and practice by assessing the content of MCCAPs and the processes by which they were prepared. To facilitate this, the ICIT conceptual framework for adaptation policy development will be operationalized for coding in NVivo 10.0. The emphasis of the content analysis of MCCAPs will be on an assessment of the Initiation and Capacity-building stages. To assist with the development of coding themes and categories, the following list of questions has been generated to guide the content analysis and assist with the development of thematic coding categories.

CONTENT ANALYSIS PROCESS

1. MCCAP data (n=53) gathered and organized [complete]
2. NVivo 10.0 license purchased
3. Coding categories developed and organized
4. Coding instrument reviewed and tested
 - a. Barbara Paterson (SMU)
 - b. Jamie Baxter (UWO)
5. Coding in NVivo 10.0 (n=53)
6. Analysis of coded findings to determine key themes for further research

GUIDING QUESTIONS

Initiation

Focusing events

Is there evidence of focusing events described in the MCCAPs (discrete, place-based climate impacts)? What, where and when are the focusing events that are discussed the MCCAPs?

Agents [internal / external]

Who was involved in the production of the MCCAP? How many people were involved on the MCCAP committee? What positions internal /external to the implementing organization were involved in the preparation of the MCCAP? Is it described how and why were these agents involved?

Policy levers

** NS municipalities were all subject to the MCCAP policy mandate creating uniform conditions for this aspect of the MCCAP initiation process.*

Problem-definition

How are climate risks framed in the MCCAP? Are climate risks seen as valid? What is the basis for validation? Are risks seen as severe? Categorically, which framing best describes the MCCAP problem frame? 1. Hazard frame? [discrete, specific] 2. Risk frame? [discrete, generic] 3. Vulnerability frame? [social, physical, economic] 4. Resilience frame? ['bounce back' / 'bounce forward']

Agenda-setting

What factors contributing to the adaptation agenda setting process are recognized are overtly recognized within the MCCAP? Is there evidence of political endorsement? If yes, what is the evidence? Is there evidence that the agenda-setting process is robust and collaborative? If yes, how and why?

Capacity Building

Formulation of policy options

What adaptation policy options are considered in the MCCAP? What is the scope of policy options described? What are the means described? What municipal policy levers described in the MCCAP are considered to facilitate adaptation (ex. bylaws, regulations, zoning)? Does ‘usable’ science inform policy formulation? If yes, how? Categorically, how can the MCCAP policy options best be described? Protect? Accommodate? Modify threat? Prevent effects? Behavior change? Knowledge mobilization? Retreat? Do nothing? Bear/share loss? Change location?

Prioritization of policy options

What processes are used to prioritize adaptation policy options and make decisions? Is risk management utilized? Categorically, are the follow aspects described in the MCCAP policy options formulation and prioritization process? Technical feasibility? Economic efficiency? Multi-criteria analysis? Social acceptability? Political viability?

Stakeholder & public engagement

Who is engaged in the policy formulation and prioritization? Local knowledge? Experts? How are stakeholders engaged in the planning process? How many times are stakeholders engaged? How often are stakeholders engaged? Are there mechanisms describing how stakeholder engagement will be sustained? Is there evidence of external institutional collaboration and/or horizontal collaboration within the organization? What types of public engagement tools are used?

Political support

What evidence is there of political support in the MCCAP? Is there evidence of utilizing strategies to build political support for adaptation? Is there evidence of funding allocation to capacity-building and implementation activities? Are policy choices reflective of no-regrets / co-benefits options?

No-regrets implementation

Can the prioritized policy options be described as ‘no-regrets’? Are the trade-offs described?

Co-benefits implementation

Can the prioritized policy options be described as ‘co-beneficial’? Are the trade-offs described?

The integration / transformation stages will be experimentally included in the content analysis protocol, but for the purposes of this study, are secondary to the emphasis and analytic focus on the initiation and capacity-building stages.

Integration

Is there evidence of integration? For example, are changes to day-to-day operations, job-descriptions and decision-making processes described? Is integration in planning and policy-making processes described?

Adaptive management

Is there evidence of adaptive management? Can policy options be described as both ‘robust’ and ‘flexible’?

Transformation

Is there evidence of ‘transformative’ discourse (structural / institutional reform) in the MCCAP? Are policy options framed with respect to achieving the following long-term objectives? ***Decrease vulnerability? Strengthen adaptive capacity? Increase resilience? Sustainable development in the context of climate change?***

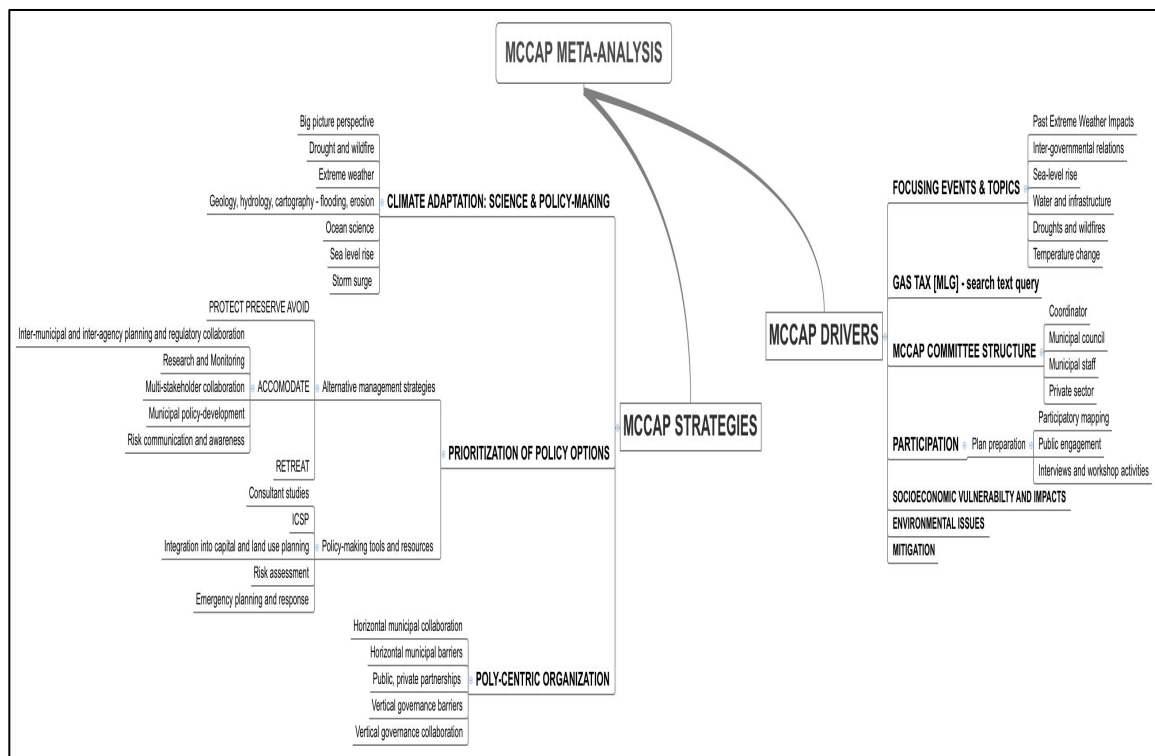


Figure 10: NVivo X-Map of Meta Analysis Quasi Manifest Coding [N=36MCCAPs]

Appendix B3: MCCAP Guidebook Content Analysis

<i>Functional policy questions</i>	<i>Municipal Climate Change Action Plan Guidebook: Canada-Nova Scotia Agreement on the Transfer of Federal Gas Tax Funds (SNSMR, 2011)</i>
1. Goals: What does the adaptation policy/plan aim to achieve?	"The main goals of adaptation usually include: alleviating current and projected future impacts; reducing sensitivity and exposure to climate-related hazards; and increasing resiliency to climatic and non-climatic stressors." P.1
2. Targets: Whose behavior is targeted by the adaptation policy/plan?	"...to help municipalities prepare Municipal Climate Change Action Plans (MCCAP) that meet the municipal obligation described in the 2010 - 2014 Municipal Funding Agreement. The guide aims to help municipalities reduce greenhouse gas emissions and identify priorities for climate change adaptation." P.i
3. Instruments: What tools are selected to achieve adaptation objectives?	<p>"The Gas Tax Fund Agreement was originally signed in September 2005. It provided \$145.2 million in federal funding to invest in eligible municipal infrastructure projects from 2005 to 2010.</p> <p>Additional gas tax funding of more than \$223 million over four years, starting in 2010, will enable municipalities to continue to invest in environmentally sustainable infrastructure projects that contribute to reduced greenhouse gas emissions, cleaner water or cleaner air. The Gas Tax Fund promotes the economic, social, environmental and cultural sustainability of Nova Scotia municipalities.</p> <p>As a requirement for the 2010 - 2014 Gas Tax Agreement and the Municipal Funding Agreements (MFAs), municipalities will be required to prepare and submit to Service Nova Scotia and Municipal Relations (SNSMR) a Municipal Climate Change Action Plan (MCCAP) by December 31, 2013.</p> <p>The MCCAP will be an amendment to the Integrated Community Sustainability Plans (ICSP), which were prepared by municipalities and submitted to the province in March 2010. The MCCAP will focus on both climate change adaptation and mitigation and will describe how municipalities plan to respond to climate change.' P.i</p>
4. Agents: Who is allocated responsibilities to implement the adaptation policy/plan?	The costs associated with the development of the MCCAP may be funded through the Federal Gas Tax Transfer Program, in whole or in part. The costs of engaging in-house resources are limited as per Schedule 2, section 1 of the MFAs.
5. Setting the agenda: How did adaptation policy/planning arise on the agenda?	<p>In addition, the MCCAP will move Nova Scotia towards honouring commitments made in Toward a Green Future: Nova Scotia's Climate Change Action Plan, specifically: Action 48 - Amend funding agreements with municipalities by 2010 to require climate change strategies in municipal Integrated Community Sustainability Plans.</p> <p>Adaptation: Six-Step Planning Framework</p> <p>The next part of the guide will assist in the preparation of a Climate Change Adaptation Plan. It presents a six-step planning process. Each step begins by outlining key objectives. The objectives summarize what will be achieved upon completion of the step. Each step will take you through a series of 'self-assessment' questions, designed to probe more deeply into climate change impacts, affects and accompanying municipal issues. More specifically, the steps will help you to understand where impacts are already being felt, where you might expect them to occur in the future, what parts of your municipality are vulnerable, who might be affected, what kinds of</p>

	<p>actions are required, and where they will be applied.</p> <p>Preparing careful and thoughtful responses to the questions listed in each step will contribute to a flow of gained knowledge and new information. The overall intention is to help your municipality determine where to focus adaptation efforts. Many questions are designed to lead to additional questions and new avenues of analysis that are directly applicable to the circumstances characterizing your municipality. The accompanying research and analysis required to answer these questions, will over time, help to build internal capacity. Questions which require your team to develop deeper analysis, or follow-up with subsequent research, will form the basis for a broader understanding of the issues.'</p> <p>Step One: Build a Team</p> <p>Step Two: Impacts and Hazards</p> <p>Step Three: Affected Locations</p> <p>Step Four: Affected Facilities</p> <p>Step Five: Social Considerations</p> <p>Step Five (b): Economic Considerations</p> <p>Step Five (c): Environmental Considerations</p> <p>Step Six: Priorities for Adaptive Actions</p>
<p>6. Framing the problem: How is the adaptation policy/planning problem framed?</p>	<p>Successful adaptation does not mean that negative impacts will not occur, only that they will be less severe than would be experienced had no adaptation occurred. Simply put, adaptation is all about understanding climate impacts and effects, in order to undertake substantive actions that make communities and municipal investments more resilient to the harmful effects of weather and climate. In addition, actions undertaken may also capitalize on any positive long-term opportunities that will result from these changes.</p> <p>Municipalities with adaptive climate change initiatives and actions already described in detail in their ICSP documents will have a head-start in the development of the adaptation requirements of the MCCAP. Work already completed can be transferred directly into the appropriate section of the final plan, and will form the foundation for any additional actions that may be result from working through the adaptation planning framework described in Part Four of this guide.</p> <p>Be Prepared: The Benefits of Planning for Climate Change</p> <p>Planning at the municipal and community level presents an important avenue for local adaptation as well as for greenhouse gas mitigation; and there are a number of reasons why municipalities should be actively involved in planning for climate change. The foremost, is that many impacts and hazards associated with climate change translate into issues that are local in nature, and directly affect communities, people and businesses. Other reasons to plan include the protection of municipal investments (such as infrastructure and municipally- owned and operated facilities) because climate change can seriously damage expensive infrastructure and affect the delivery of municipal services. One of the most widely accepted, and effective ways to manage climate change within the context of municipal operations, is to develop a plan or strategy that strives to understand the problems and present realistic approaches to dealing with them.</p> <p>Municipalities cannot simply rely on the assumption that the prevailing climate will be more or less the same as it was over the past 50 to 100</p>

years. We can expect to live in a climate with different rainfall patterns, warmer temperatures, more frequent storms, and severe weather events. These changes in climate will directly affect municipalities across Nova Scotia. In particular, infrastructure location and design, where and how land is zoned and subdivided for development, how water and wastewater treatment plants, or how local roads and other municipal assets are maintained, renewed and managed.

Early adoption of policies on climate change will help to develop a strategic approach to determining where to best focus municipal efforts, resources and new infrastructure expenditures. Planning for climate change helps to make decisions more cost-effective and also helps to guard against unforeseen and burdensome costs. This approach is in direct opposition to reactive policies and actions that attempt to minimize consequences after an event that has already occurred. A reactive approach has been shown over and over to be far more costly to municipalities. Hurricane Juan, for example, is estimated to have cost over 100 million dollars in damages. within a context that ensures that climate change criteria are applied.p.2

Estimated Storm damage Costs

Hurricane Juan, 2003 – 100 million

Meat Cove, oct. 2010 – 7.2 million

Central Nova, dec. 2010 – 13 million

Southwest Nova, Nov. 2010 – 5.6 million

How Municipalities will be affected:

rising costs of damaged infrastructure

Protection and repair

Public safety

drinking water quality

Wastewater and Storm water management

liability

Public expectation

	<p>Like any program, the sooner municipalities begin to plan for climate change, the more likely the behavior will become institutionalized, and integrated into daily practice so that eventually, all decisions will be framed</p>
<p>7. Engaging stakeholders and the public: How are they engaged in the adaptation policy-making and planning process?</p>	<p>Public Participation</p> <p>For the purposes of the MCCAP the public participation component of the plan will be adequately covered through the inclusion of stakeholders in the process (see Part Two, Step One). Municipalities may also expand this part of the process to involve a broader scope of public participation.</p> <p>Regional Action Plans</p> <p>Municipalities can work together on a regional level to tackle common impacts, issues and problems associated with climate change, at both the mitigation and adaptation levels. Regional collaboration allows municipalities to pool resources which can be directed towards regional-scale objectives; and wherever possible, municipalities are encouraged to work together in this capacity.</p> <p>Municipalities that do wish to work with one another should contact SNSMR to understand what the final plan content would entail, and what individual MCCAP, MFA and Gas Tax responsibilities remain, regardless of the inter-municipal adaptation partnership.</p> <p>p.2</p>
<p>8. Setting adaptation priorities: Is there an explanation of the way in which priorities are set? How does it vary across cases?</p>	<p>What is Adaptation to Climate Change?</p> <p>Adapting to climate change involves undertaking actions and activities that are specifically designed to reduce and minimize the harmful consequences of changing climate. Conversely, adaptive actions can also be designed to take advantage of any potential long-term opportunities that come with changes in local and regional climate. For example, a longer growing season in agricultural areas of the province.</p> <p>Adaptation is built on the premise that appropriate actions are undertaken before major impacts occur or shortly after they take place, so that similar damage in the future is anticipated and minimized. Both of these types of adaptation responses can be planned in advance. In most cases, planned adaptation will incur lower long-term costs and is seen to be far more effective than simply reacting to climate change in an unplanned, ad-hoc manner.</p> <p>Adaptation at the municipal level also involves new ways of thinking about infrastructure design, renewal and maintenance. It involves adaptive land-use planning and neighbourhood design and also adaptive water and energy management, in addition to other adaptive measures that will help to ensure that our communities are prepared and will be resilient.</p> <p>determining vulnerability & Managing risk</p> <p>The measure of how sensitive certain elements of a municipality or community are to climate change impacts is often known as vulnerability. The overall vulnerability of a community to climate change will vary between one community and another. In other words, a variety of factors and variables dictate vulnerability. For example, communities located within close proximity to the coast or watercourses are more susceptible to storm surges than inland communities which are more sheltered. Coastal communities are therefore, more vulnerable (at greater risk) because their location makes them susceptible to shoreline erosion, flooding, and wind damage. p.3</p>

<p>9. Formulating policy options: How were adaptation planning and policy options formulated?</p>	<p>How Can Municipalities Adapt?</p> <p>Vulnerability can be reduced through the careful implementation of adaptive management practices, actions, policies and initiatives that are specifically designed to limit and minimize negative impacts. For example, identifying vulnerable infrastructure, incorporating adaptive planning into land-use policies, revising emergency response measures, and accounting for sea-level rise when planning and building new infrastructure will serve to protect new developments, private property, municipal capital investments, as well as the environment.</p> <p>Municipalities can also adapt by considering the vulnerability of their services and the supporting infrastructure. For example, water treatment facilities and water distribution systems provide safe drinking water. Sewage treatment facilities and distribution systems collect and treat waste. Adaptive planning takes these considerations into account by developing measures which ensure that important services continue to operate during, or following extreme weather events.</p> <p>Other effective adaptation measures include: managing development in coastal areas and flood-prone watercourses; protecting coastlines around significant sites; and restricting or preventing construction in areas of known vulnerability.</p> <p>There is little doubt that climate change will affect a broad range of municipal assets and local government services, in addition to municipal operations and policy decisions. Climate change adaptation is a matter of risk management and good governance; and at the local government level, there are several key areas of municipal influence where adaptation can begin:</p> <ul style="list-style-type: none"> • Licensing and Regulation – Municipalities can use their powers to set the local regulatory environment in conjunction with their ability to enforce regulations, to implement and enforce adaptive policies. • Facilitation, Advocacy, Leadership and Public Education – Municipalities can use their close contact and relationship with community organizations, businesses, residents and other stakeholders at the local level, to develop a shared understanding of the issues and to develop collaborative responses to climate change. • Service Delivery, Community Development and Civic Engagement – Many of the services provided by municipalities for businesses and residents can be reviewed in light of adaptive climate change initiatives. <p>P.5</p>
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Appendix B4: Sample Search-Text-Query Results

South West Nova Scotia Municipalities [Sample of 9 / 6 available]			NVivo Text Search Queries		
#	Municipality	MCCAP Status	Gas_Tax	ICSP	Integrated_ Community_ Sustainability_ Plan
1	Municipality of the District of Shelburne (218)	Complete	0	6	3
2	Town of Lockeport (112)	Complete	3	11	2
3	Town of Yarmouth (131)	Complete	0	19	7
4	Municipality of the District of Yarmouth (221)	Complete	4	5	5
5	Municipality of the District of Argyle (203)	Complete	10	3	2
6	Municipality of the District of Barrington (204)	Complete	0	4	0
7	Queens (303)	Complete	1	0	0
8	Town of Shelburne(122)	Complete	9	3	5
9	Clark's Harbour (108)	Complete	1	1	0

Appendix C1: Ethics Approval (2014-2015)



Research Ethics

Western University Health Science Research Ethics Board NMREB Delegated Initial Approval Notice

Principal Investigator: Dr. Gordon McBean
Department & Institution: Social Science\Geography, Western University

NMREB File Number: 105318
Study Title: Adapting to Climate Change: The Case of Local Governance and Municipal Planning in Nova Scotia
Sponsor:

NMREB Initial Approval Date: June 25, 2014
NMREB Expiry Date: March 31, 2015

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Other	2.3 Supplemental - Detailed research design documentation (received for information only)	2014/05/05
Advertisement	Email Script for Recruitment	2014/05/14
Instruments	This is a preliminary focus group outline dependent on the completion of other research tasks.	2014/05/14
Letter of Information & Consent	LOI/consent for interview group	2014/06/02
Letter of Information & Consent	LOI / consent for focus groups	2014/06/10
Western University Protocol	(received June 24/14)	

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the HSREB Initial Approval Date noted above.

NMREB approval for this study remains valid until the NMREB Expiry Date noted above, conditional to timely submission and acceptance of HSREB Continuing Ethics Review.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Ethics Officer, on behalf of Riley Hinson, NMREB Chair

Ethics Officer to Contact for Further Information

____ Erika Basile	____ Grace Kelly	____ Mina Mekhail	____ Vikki Tran
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This is an official document. Please retain the original in your files.

Appendix C2: Ethics Approval (2015-2016)



Western
Research

Research Ethics

Western University Health Science Research Ethics Board NMREB Annual Continuing Ethics Approval Notice

Date: March 31, 2015

Principal Investigator: Dr. Gordon McBean

Department & Institution: Social Science\Geography, Western University

NMREB File Number: 105318

Study Title: Adapting to Climate Change: The Case of Local Governance and Municipal Planning in Nova Scotia
Sponsor:

NMREB Renewal Due Date & NMREB Expiry Date:

Renewal Due -2016/05/31

Expiry Date -2016/06/25

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed the Continuing Ethics Review (CER) form and is re-issuing approval for the above noted study.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), Part 4 of the Natural Health Product Regulations, the Ontario Freedom of Information and Protection of Privacy Act (FIPPA, 1990), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.



Ethics Officer to Contact for Further Information

Erika Basile	Grace Kelly	Mina Mekhail	Vikki Tran
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This is an official document. Please retain the original in your files.

Appendix E1: Focus Group Letter of Information



Dr. Gordon McBean, C.M., O.Ont, Ph.D., FRSC
Brennan Vogel, BES MA



July 17, 2014

Focus group invitation

As a stakeholder in the Nova Scotia's Municipal Climate Change Action Planning (MCCAP) process, you are invited to participate in an upcoming focus group that will take a closer look at the factors that constrain and/or contribute to municipal adaptation policy-making, and the roles that inter-governmental policy collaboration can play in facilitating climate risk reduction and adaptation at the local scale. This letter is intended to provide you with the information required for you to make an informed decision regarding your participation in this research.

The purpose of this PhD research study is to develop a clearer understanding of the factors that affect the robustness of adaptation policy and planning processes at the local government level. While the research is based in the Department of Geography at the University of Western Ontario, the research is funded by the Marine Environment Observation Prediction Response (MEOPAR) - a network of centres of excellence that is chaired in the Department of Oceanography at Dalhousie University. This research study is also supported through in-kind collaboration with the Nova Scotia Department of Municipal Affairs and the Nova Scotia Department of Environment, Climate Change Directorate.

As a research participant, you can contribute valuable information and insight into the enabling and constraining conditions that may influence the implementation of MCCAPs. Eligible focus group participants include municipal adaptation policy-makers and planning stakeholders involved in the production and implementation of municipal adaptation policy and planning measures. Specifically, this includes: municipal staff, municipal council members, municipal adaptation committee members; provincial adaptation policy and planning stakeholders and non-governmental organization staff involved in municipal adaptation policy and planning. Subject-matter experts on municipal adaptation policy and planning (boundary organizations, academia, consultants, industry and departments in the federal government) are also invited to participate.



Focus group format

The focus group will last 3 to 4 hours. While you will not be compensated for your participation, lunch and refreshments will be provided. The focus group will consist of two main activities.

First, you will be provided with a brief Power Point presentation that will discuss findings emerging from recent research and analysis of the Nova Scotia MCCAPs. This presentation will summarize key research findings derived from the MCCAPs, elaborating on the key climate change adaptation drivers and strategies discussed in Nova Scotia municipalities' MCCAPs.

Second, you will be asked to participate in an interactive stakeholder dialogue. Stakeholders will be engaged in a facilitated discussion on the three key topic areas:

1. Alternative management for climate change adaptation: risk prioritization processes and municipal policy-making strategies;
2. The roles for inter-governmental collaboration in facilitating MCCAP implementation;
3. The roles for academic research collaboration in supporting MCCAP facilitation and implementation

Benefits of participation

Sharing first-hand knowledge of municipal policy and planning barriers and opportunities in focus groups may help to contribute to the improvement of adaptation policy and implementation processes in Nova Scotia, and more broadly. This ultimately may contribute to reducing public and private properties damages and loss of life associated with climate change impacts. As well, developing proactive adaptation approaches may minimize losses and contribute solutions for improved disaster response and post-disaster recovery and reconstruction.

Focus group venues, dates & times

Location	Venue	Date	Time
Amherst		September 14 2014	9:00am-12:00pm
Port Hawkesbury		September 16 2014	9:00am-12:00pm
Bridgewater		September 18 2014	9:00am-12:00pm
Shelburne		September 20 2014	9:00am-12:00pm



Registration

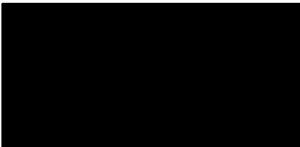
If you would like to participate, simply choose your focus group location and visit the corresponding website to register online. You will receive a confirmation email with further details and instructions.

Location	Registration Website
Amherst	https://www.eventbrite.ca/e/mccap-focus-group-workshops-tickets-12308730745
Port Hawkesbury	
Bridgewater	
Shelburne	

Thank you for considering participating in this PhD research study about municipal climate change adaptation policy and planning. A supplemental letter of information and a consent form are also included. If you require any further information regarding participating in the study you may contact:

Principal Investigator:

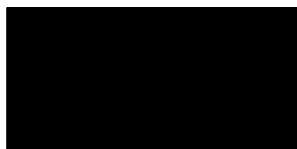
Dr. Gordon McBean, C.M., O.Ont, Ph.D., FRSC



Co-Investigator:

Brennan Vogel, BES MA

PhD Candidate





Letter of Information

Project Title: Adapting to Climate Change: The Case of Local Governance and Municipal Planning in Nova Scotia

If you agree to participate in this study, you will be asked to sign a written Consent Form at the focus group. This letter of information is yours to keep for future reference.

You will not be compensated for your participation in this research. Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect. Stakeholders failing to meet the inclusion criteria and/or lack of knowledge and/or involvement in the research subject are not eligible to participate in this study.

All data collected will remain confidential and accessible only to the investigators of this study. Due to the nature of participating in a focus group, full confidentiality cannot be guaranteed and participants should refrain from discussing other participants or topics discussed in the focus group outside of the group session.

Focus group research data will be collected via note-taking and data collection forms by investigators. Personal information identifiers will be collected during focus groups for conducting an iterative feedback process with research participants. This information will be stored separately from the main data. Electronic data will be transmitted via password encrypted electronic storage on a laptop and paper files containing personal information will be stored separately and transported using a locked steel security file box.

Pseudonyms will be utilized to protect personal information of research participants. If the results are published, your name will not be used.

If you would like to receive a copy of any potential study results, please contact Brennan Vogel.

The data will be kept for a minimum of 5 years, after which time electronic data will be deleted and paper documents will be shredded. If you choose to withdraw from this study, your data will be removed and destroyed from our database. While we will do our best to protect your information there is no guarantee that we will be able to do so. Representatives of The University of Western Ontario Non-Medical Research Ethics Board may contact you or require access to your study-related records to monitor the conduct of the research.

Risks to study participants are minimal, however a potential social / psychological risk may be conflicts arising in the municipal work environment as a consequence of participating in an in-depth research study that requires disclosing first-hand knowledge of barriers / opportunities for improving adaptation policy / planning at the local scale. A potential inconvenience to research participants is the loss of work time to participate in the research.

If you have any questions about your rights as a research participant or the conduct of this study, you may contact:

The Office of Research Ethics [REDACTED]



Focus Group Consent Form

Project Title: Adapting to Climate Change: The Case of Local Governance and Municipal Planning in Nova Scotia

Co-Investigator: Brennan Vogel, Department of Geography, University of Western Ontario

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Participant's Name (please print):

Participant's Signature:

Date:

Person Obtaining Informed Consent (please print):

Signature:

Date:

Appendix E2: Focus Group Protocol

Four focus groups were conducted in Nova Scotia municipalities in fall of 2014. Focus groups occurred in the Towns of Amherst (Wandlyn Inn, September 15), Port Hawkesbury (Civic Centre, September 17), Bridgewater (Lunenburg County Lifestyle Centre, September 22) and Shelburne (Osprey Arts Centre, September 24). The MEOPAR Partnership Development Fund provided research funding for conducting these focus groups with in-kind support from the Nova Scotia Department of Municipal Affairs (DMA), the Union of Nova Scotia Municipalities (UNSM) and the Nova Scotia Planning Directors Association (NSPDA). The primary research objective of conducting focus groups was to build knowledge of the factors that adaptation policy stakeholders perceived as influential in the early stages of adaptation policy development in Nova Scotia municipalities.

Participants were recruited utilizing listservers to distribute an emailed invitation via in-kind research partners in Nova Scotia to the targeted demographics in all municipalities in August, 2014. This included the UNSM Association of Municipal Administrators' (AMA) listserve on August 11, the UNSM Green E-Newsflash list-serve on August 11, the DMA-NSPDA listserve on August 13. A second recruitment effort was marshaled in early September of 2014 via the DMA-NSPDA listserve on September 2 and the UNSM listserve on September 3 to increase focus group participant recruits. The emailed invitation was made available to the primary target demographics of municipal staff (planning), municipal council members, municipal adaptation committee members. As well provincial adaptation policy and planning stakeholders and non-governmental organization staff involved in municipal adaptation policy and planning and subject-matter experts on municipal adaptation policy and planning (boundary organizations, academia, consultants, industry and departments in the federal government) were also secondarily targeted for research participation.

Participants were invited to participate in an interactive stakeholder dialogue and engage in a facilitated discussion on the three key topic areas including:

- Alternative management for climate change adaptation: risk prioritization processes and municipal policy-making strategies;
- The roles for inter-governmental collaboration in facilitating MCCAP implementation;
- The roles for academic research collaboration in supporting MCCAP facilitation and implementation

Interested participants were encouraged to visit one of 4 prepared registration websites (via www.eventbrite.ca) in order to confirm interest and self-register for participation in one of the four focus groups locations.

All focus groups were conducted in the morning commencing at 9:00am and concluding with a provided lunch at 12:00pm. At 9:00am, coffee was provided to create a social forum for casual introductions and networking. At 9:15am the focus group convener and facilitator provided an introductory PowerPoint presentation detailing focus group logistics (participant nametags, MEOPAR overview and research project description, focus group participant consent form), and a description of the focus group format. As well, preliminary information related to MCCAP high-risk ratings for climate impacts was provided (e.g. Based on a sample of 40 MCCAPs, 67% of MCCAPs ranked hurricanes and high winds as high risk; 61% ranked inland flooding and heavy precipitation as high risk; 60% of MCCAPs ranked storm surge and sea level rise as high risk).

At 9:30am, focus group participants were then divided into 3 rotating discussion groups consisting of 3-6 focus group participants from different municipalities in each group. Participants were

allowed to self-select and self-organize the discussion groups for focus group discussion and tables were provided and prepared with the following materials:

- 1 laminated discussion topic placard with 4 discussion questions
- 3-6 individual work sheets for note-taking
- Group work sheets for table note-compilation
- Pens/pencils for recording
- Dot stickers for later sticker voting exercise

Participants then rotated through each of the three discussion topics for a total of 1 hour and 30 minutes, provided with 30 minutes for discussing each topic. Participants were instructed to use the materials to first record individual ideas and answers to the 4 discussion questions on the provided individual worksheets. After individual recordings occurred, participants were encouraged to discuss their answers to the questions in order identify major shared themes as a small focus group. Participants were told to feel free to ask questions and to participate openly and candidly, utilizing large format worksheets for recording group discussions findings. At the end of each discussion topic, individual worksheets were collected for later digitization and analysis.

At 11:00am, participants were provided a coffee and snack break, while the topic-based group worksheets were collected and posted on walls for large focus group review and sticker voting in order to identify the topics of greatest interest, based on the questions addressed in the three topics covered, for large-group synthesis discussion. Voting was encouraged at 11:15am and large group synthesis discussion occurred from 11:25am – 12:00pm, moderated by the focus group facilitator, with 2 or 3 topics rapidly identified and selected for synthesis discussion based on the greatest group allocations of dot stickers. Large group synthesis discussions were also recorded utilizing a portable audio device for later transcription and analysis, while discussion topic sheets were later transcribed. At 12:00pm the focus group concluded and lunch was provided.

Focus Group Participants' Instructions

PART 1 INSTRUCTIONS:

Self-select a discussion topic to begin the focus group

Take a few minutes to individually consider the questions provided and make notes for small group discussion on the individual work sheets

Working with your table, nominate a group note taker and collectively work through the questions provided, making 1 compiled set of notes based on the small group discussion

Rotate to the next discussion topic, ensuring that you cover the 3 topic areas in the focus group

PART 2 INSTRUCTIONS:

During the break, group notes are collected and compiled for large group discussion & reflection

After the break, focus group participants are asked to review compiled group notes and rank top 5 discussion topics of interest

Following ranking, the focus group is facilitated through top ranked discussion topics with an open forum for large group comments & synthesis discussion

Focus Group Participants' Discussion Topic Questions

Discussion Topic: Strategic Municipal Policy Development

How did your municipal MCCAP committee form & how was the work plan for developing the MCCAP determined?

What methods of stakeholder consultation &/or public participation and/or other engagement methods were utilized in your municipalities' MCCAP preparation?

What methods were utilized by the MCCAP committee for risk prioritization processes & what were the key outcomes in setting adaptation priorities for your municipality?

What roles did you see for inter-departmental staff collaboration &/or staff/council relations in the MCCAP development? What roles do you see for staff/council in MCCAP implementation?

Discussion Topic: Multi-level Governance Collaboration

What horizontal collaboration occurred between municipalities and/or other municipal agencies in preparing your municipalities' MCCAP? If no horizontal collaboration occurred, why or why not?

What vertical collaboration occurred between your municipality and higher levels of government in preparing your MCCAP? Which departments provincially and federally were most important for MCCAP preparation? Why?

Consider the Gas Tax & MCCAP - how important was the Gas Tax as a driver for MCCAP? In other words, would the MCCAP have occurred without the Gas Tax incentive?

When considering bridging the implementation gap between MCCAP preparation and implementation, what are the major barriers for MCCAP implementation? What are the major opportunities?

Discussion Topic: Academic Collaboration

What roles, if any, did academia play in your municipalities' MCCAP development? If yes, was it useful? Why or why not? If no, do you think academic collaboration would have been beneficial?

Going forward, what roles do you see for academia to play in MCCAP implementation [in terms of facilitating implementation through filling knowledge gaps &/or meeting research needs for your municipality]?

Does academia have a role to play in decision-support for your municipality? If yes, how do you see this occurring? Why is it important?

What do you see as future directions for the monitoring and evaluation of implementing MCCAP priorities? Can academia support this process?

Appendix F1: Interview Letter of Information



Brennan Vogel, BES MA

September 2014

To:

Thank you for your agreement to participate in a confidential, semi-structured interview about the Nova Scotia Municipal Climate Change Action Planning (MCCAP) policy process. This letter of information and the attached interview protocol will provide you with further information pertaining to our interview on _____ in _____, Nova Scotia.

The purpose of this study is to develop a clearer understanding of the factors that affect the robustness of adaptation policy and planning processes at the local government level. As such, the objective of conducting confidential, semi-structured interviews is to build knowledge of the factors that adaptation policy stakeholders perceive as influential in the early stages of adaptation policy development in Nova Scotia municipalities. Your collaboration and cooperation in this research is greatly appreciated.

About your interview in this study

The primary aim of the case study interviews is to encourage participants to share stories about the factors that enable and/or inhibit progress on adaptation planning and implementation in their municipality. Your interview is part of a larger comparative case study analysis that aims to produce knowledge about local adaptation policy-making. Four municipal case study sites sharing a high sensitivity to climate risks have been selected for in-depth comparative case study. To allow for comparability between cases, site selection has been based on similar attributes of vulnerability to coastal risk (location and population size). The case study sites are the Towns of Amherst, Port Hawkesbury, Bridgewater and Shelburne.

As a research participant, you can contribute valuable insights into the policy development process and the implementation of MCCAPs in Nova Scotia's municipalities. Your interview participation serves as a critical part of furthering adaptation theory as well as producing applied, policy-relevant research findings. With your informed consent, the interview will be recorded, but your identity will be kept confidential. Anonymity frees participants to speak openly and candidly. Participants may refuse to answer questions at any point of the interview. All responses will be recorded using note taking and an audio recording device. With



your permission, during the subsequent analysis, you will be given a pseudonym and your responses will be used anonymously in compiling the research findings.

Following the completion of case study interviews, transcription and content analysis of all interviews will be conducted with NVivo qualitative data analysis software. The aim of this research activity is to reveal the shared and common patterns from across the interviews, as a means of synthesizing reliable findings. In addition, a conceptual framework constructed from academic adaptation literature guides this study. This framework provided the rubric for conducting a content analysis of MCCAP plans also using qualitative data analysis software.

Producing valid, rigorous and policy-relevant findings pertinent to assessing current municipal adaptation policy efforts can inform the next steps towards MCCAP implementation in Nova Scotia. At larger scales, the study's findings and recommendations could lead to better overall outcomes in adaptation policy-making and governance of the adaptation efforts in Nova Scotia and Canada.

Please find the Interview Protocol attached. If you have any further questions pertaining to this study, please feel free to contact:

Brennan Vogel
PhD Candidate
Department of Geography
University of Western Ontario



Appendix F2: Interview Protocol



Semi-structured Interview Protocol

Your interview is scheduled to last 1 hour and will consist of a conversation based on the following set of semi-structured questions and topics, provided here for your consideration prior to the interview. Thank you for your interest and collaboration in this research study on municipal climate change adaptation.

Our conceptual framework for understanding the enabling/constraining conditions for local adaptation policy initiation and development consists of the following related factors:

- political direction affecting climate risk problem definition and agenda setting;
- ‘focusing events’ occurring from past experience with climate change hazards and/or impacts influencing how problems are defined and agendas are set;
- the roles of internal agents and/or external stakeholders influencing the development of adaptation policy approaches; and,
- policy levers such as financial incentives and/or regulatory mandates from higher levels of government influencing how adaptation policy is initiated and/or developed

Which of these factors would you say affected the MCCAP development process the most in your municipality? Are there additional factors we have not considered in this conceptual framework that you could elaborate on?

How were climate change risks identified and prioritized in your MCCAP?

Prior to the mandated MCCAP, did climate change hazards and impacts affect planning in your municipality? How? Please describe any major historical events that may be associated with climate change hazards in your municipality. Did these impacts change planning or the governance of climate change risks and hazards in your municipality?

How important a role did the Gas Tax play in your municipality for instigating climate change adaptation policy development through planning efforts? Would your municipality have taken actions on climate change without the Gas Tax incentives? If possible, please provide examples of climate change adaptation actions taken prior to the MCCAP.

What stakeholders (individuals, groups, organizations) with major stakes in the MCCAP adaptation policy process are considered important in your municipality? Were these stakeholders engaged in the MCCAP development? Why or why



Similarly, was the general public engaged in the MCCAP adaptation planning process? Why or why not?

Did completing the MCCAP process benefit community preparedness for dealing with coastal climate change risks? Why or why not?

What do you think are the major constraining factors on MCCAP implementation?

Going forward, who has the major decision-making and implementation authority for the MCCAP priorities? Will MCCAP priorities be integrated into the municipalities' planning and operations?

Do you think MCCAP implementation requires mainstreaming adaptation through changes to day-to-day operations, job-descriptions and decision-making processes? How would this occur? Why is it important?

Consider these statements from the literature:

'The nature of governance is thought to be a major determinant of the success of an adaptation process to climate extremes' (Finan and Nelson, 2009).

Adaptation governance can be conceived to be 'the set of decisions, actors, processes, institutional structures and mechanisms, including the division of authority and underlying norms, involved in determining a course of action' (Moser, 2009).

In the social and political context underlying the MCCAP policy process question, would you be able to describe a few examples of effective and ineffective governance when addressing climate change adaptation? What some of the attributes that make governments effective managers of climate change risks?

In the context of adaptation theory, the literature suggests the following to be attributes that may factor or influence the nature of adaptation decision-making:

- formal and informal values – what is believed to be important in society
- social norms and expectations – beliefs about what should be in society
- legislative division of authority – horizontal divisions of authority between neighboring municipalities and vertical divisions of authority with higher levels of government
- research programs – collaborations with academia, non-governmental organizations, government agencies and/or the private sector



- management responsibilities – the duties and obligations entrusted to public managers to act upon in protecting public interests

Please describe if you think any of these dynamic attributes may play a role in the success of your MCCAP being implemented. How and why? Which contextual social or political factors do you consider to be the most important to successful MCCAP implementation?

Consider the following adaptive capacity levers for implementing adaptation plans:

- Availability and equitable distribution of economic resources
- Access to technology for better understanding climate risks
- Access to climate change information (e.g. knowledge of adaptation options for various impacts)
- Skills to make use of climate change information
- Adequate policy infrastructure for enabling climate risk decision-making
- Adequate and adaptive government agencies and institutions for effectively managing climate change risks

How does progress towards the implementation of your MCCAP relate to these levers? Are these levers important for the implementation of your MCCAP in your municipality? Why or why not are they important/not important?

What resources (tools, training, leading practices, etc.) do municipalities require to move forward with implementation?

Please comment on the division of authority between the three levels of government in Canada on the issue of climate change adaptation. What do believe are the roles and responsibilities for each level of government?

How can the federal and provincial governments support municipal climate change adaptation and other climate change actions relevant to reducing greenhouse gas emissions at the local level? Are any legislative or regulatory changes needed for successful MCCAP implementation?

How do you suggest moving forward with MCCAP implementation and municipal climate change adaptation and risk reduction? What is required? Why?

Appendix F3: Individual Case Profiles

Municipality A	Population	Land Area	Median Age	Occupations
	9717 +2.2% (2006-2011)	12 square km	46	Sales and services, business, trades
Top Climate Risk Priorities	Marshland Flooding; Inland Flooding			
Adaptation strategies identified to address risk priorities	Be an engaged stakeholder; Develop a flood contingency plan for vulnerable infrastructure; Community Engagement; Update the Emergency Management Plan; Review Development Regulations; Stormwater Management; Stormwater Infrastructure Design Specifications; Land Use Policy Influenced by Climate Change			
Website Description: Municipality A being situated in the centre of the Maritime Provinces makes it the one of the best places to live, work and play. Along with excellent schools, churches and health care facilities including the regional health care centre, we have a wide variety of activities; organizations and friendly residents that will make you feel "at home". Residents of Municipality A receive excellent range of municipal services from a full time fire department to an excellent water resource that has received recognition both nationally and internationally.				

Municipality B	Population	Land Area	Median Age	Occupations
	8241 +3.7% change (2006-2011)	13.6 square km	47	Sales and services, business, trades
Top climate concerns identified in MCCAP	Critical infrastructures are vulnerable to increasing damage and disruption by extreme weather impacts; The community in general, and especially the Downtown, is vulnerable to increasing flood damage, injury, and disruption; There is a lack of local and regional capacity to plan for climate-related emergencies; There is a lack of capacity among emergency responders to provide emergency services and relief during climate-related emergencies, especially for vulnerable populations; Non-critical municipal infrastructures, assets and services are vulnerable to increasing damage and disruption by climate change in general; The community in general, and especially already vulnerable populations, is vulnerable to increasing regional economic & social problems caused by a changing climate; The local economy is vulnerable to increasing disruption and economic loss by climate-related emergencies; There is a lack of capacity in the health & social services sector to prevent and accommodate injury and assist with recovery from climate-related emergencies, especially among vulnerable populations; Local environments and threatened species are vulnerable to increasing impact by climate change			
Strategies identified to address risks in MCCAP	PRESERVE: Identify and enhance naturalized areas within the community, especially in wetlands and in flood risk areas, to act as natural buffers during flooding events; AVOID: Prevent inappropriate development from encroaching further into hazard risk areas such as flood zones, streams, wetland, and steep slopes prone to erosion; Prevent inappropriate construction of municipal infrastructure in hazard risk areas; PROTECT: Engineer structures to physically protect vulnerable geographic areas of the community from flooding, erosion, wildfire, and other climate hazards; ACCOMMODATE: Improve the self-sufficiency and sustainability of the community in general, through efforts to improve energy, food, transportation, and housing security, and reduce the chronic disease burden and health & economic inequities in the community Reduce the impact of extreme weather events through improvements in the ability of municipal infrastructure to withstand or accommodate these events (e.g. storm water system planning and upgrading, or bolstering the ability of existing infrastructure to withstand flooding); Reduce the impact of extreme weather events through improved municipal operational practices (e. g. snow clearing, fire prevention, parks & open space management); Reduce the impact of extreme weather events through improved planning regulations for new developments (e.g. storm water control, landscaping requirements); Reduce the impact of extreme weather events through community education & participation efforts targeting private properties (e.g. rain barrels, fire prevention practices, home flooding prevention measures); Improve local & regional efforts to protect biodiversity, through ecological monitoring, protection of sensitive habitats, reduction of pollution such as agricultural and sewage discharge into water bodies, and improved ecological standards for agriculture, forestry, and fisheries; Improve emergency preparedness of the community as a whole, through local & regional planning efforts, and community education efforts; Strengthen emergency services and response capacity, especially for vulnerable populations; Improve social and economic recovery support and capacity, especially for vulnerable populations; MANAGED RETREAT: Decommission buildings and infrastructures from hazard risk areas where appropriate, and rebuild in non-hazard risk areas if necessary. Convert decommissioned areas into uses that are more adaptable to extreme weather events such as naturalized wetlands or open space.			
Website Description: Hiking, Biking, Walking, Golfing, Kayaking, Sight-seeing, Shopping, Exploring, Fishing, Sailing, or maybe just Relaxing? Regardless of which 'ing' is your thing, the South Shore of Nova Scotia has much to offer and Municipality B is the perfect place from which to launch your adventure! Once here, you will find that Municipality B offers a variety of visitor services; accommodations, restaurants, parks and museums, hospital facilities, a public library, sporting facilities, and more. Most religious denominations are represented in our many churches.				

Municipality C	Population	Land Area	Median Age	Occupations
	1,686 -10.3% change (2006-2011)	9 square km	50	Sales and services, business, trades
Top Climate Hazards identified in MCCAP	Coastal flooding, inland flooding, and drought			
Strategies identified to address risks in MCCAP	Public education and outreach about coastal flood and erosion impacts; Address wastewater (sanitary sewage and stormwater); Protect public and private assets from rising water volume and flash flooding; Environmental protection and monitoring; Protect future drinking water supply; Support emergency preparedness; Strengthen municipal resources and policies to protect municipal staff and citizens; Adaptive Actions that can be achieved in cooperation with the neighboring municipality; Reduce greenhouse gas emissions			
Website Description: Municipality C is not far away from anywhere. We have excellent paved highways to travel our famous Lighthouse Route. The scenery in Municipality C is breathtaking. Miles of forests surrounding crystal lakes and crashing ocean. The air is fresh and clear. The charm of the Loyalist days is still felt in our county but amongst the history, is everything one might need for modern living. Southwestern Nova Scotia is one of the most cost effective places in North America to locate a business. The tax rate is very favourable, there is a large work force available, and the support businesses needed are plentiful. Many business people have relocated to Municipality A and run their businesses through the internet and teleconferencing.				

Appendix G1: Sample Survey Recruitment Email

From: [redacted] [redacted]

Sent: Friday, May 22, 2015 03:48 PM

To: NSPDA [redacted]

Subject: FW: MCCAP Survey - Ready for Launch May 25

Hello Planning Directors. Please see the survey attached below, provided by Brennan Vogel. For those of us who wrote, worked on, or are familiar with your Municipal Climate Change Action Plans (MCCAPs), please take the time to complete it and submit it, as outlined therein. Thanks, have a great weekend, and I look forward to seeing most of you next week at the conference.

[redacted] [redacted]

[redacted], *MCIP, LPP* [redacted]

Town Planner

Town of [redacted] [redacted]

P.O. Box 328

[redacted] [redacted]

[redacted]

[redacted]

Appendix G2: Regional Priorities

(see Q22 for application in survey – Appendices G3 and G4)

EXAMPLES OF SHARED ADAPTATION PRIORITIES IN REGIONAL MCCAPS			
Colchester & Truro	Kings County, Wolfville, Kentville & Berwick	Victoria County, Inverness County & Port Hawkesbury	Stellarton, Trenton & Westville
Conduct flood elevation planning review and amendments to local plans and bylaws based on climate trends and projections for 1:20 & 1:100 year floods	Develop and review mutual aid agreements for addressing issues with vulnerable infrastructure including: sewage and waste-water drainage infrastructure, transportation corridors and water supply well-heads	Collaborate with adjacent municipalities and emergency management organizations on public emergency preparedness education programs and disaster preparedness and response protocols; modify operational practices as necessary (ex. critical infrastructure power-backup; inspections of sewage treatment outfall infrastructure and closed landfills)	Update flood risk mapping, both within the East River Floodway and Floodway Fringe area, as well as areas of localized flooding or erosion due to flooding, based on professional engineering modelling
Initiate inter-governmental collaboration with NS Dept of Agriculture on issues of dyke height and maintenance requirements to mitigate inland flooding and protect water/waste-water infrastructure and municipal assets	Initiate inter-governmental collaboration with NS Dept of Agriculture and NS Dept of Transportation on issues of dyke height and maintenance requirements to mitigate inland flooding and protect water/waste-water & transportation infrastructure and municipal assets	Obtain LIDAR mapping data and integrate sea-level rise and storm surge data to make informed decisions about building and infrastructure placement and new developments in the context of climate change; advocate with relevant stakeholders to collaboratively address issues of coastal setbacks, floodplain mapping, storm water management, coastal access and public education	Obtain updated weather forecasting models from Environment Canada (or other source(s)) to determine if higher impact severe weather or longer drought periods can be expected, and during which times of the average year.
Develop long-term, integrated water resource management into land-use and infrastructure planning	Develop a water conservation bylaw and continue public education programs	Institute a program of community-based mapping to monitor and track climate impacts and conduct annual meetings and/or web-based communications to inform planning efforts and development projects in the context of climate change impacts and adaptation	Adopt an Inter-municipal Planning Strategy, and uniform Land Use and Subdivision By-laws (ex. engineering plans to be submitted showing how area drainage is to be addressed through grading) for all five towns in Pictou County.

Appendix G3: Survey and Tabulated Results

YELLOW HIGHLIGHTS INDICATE SCREENED FACTORS DEEMED 'IMPORTANT' FOR ACROSS CASE ANALYSIS IN THREE PURPOSEFULLY SELECTED MUNICIPALITIES (See Appendix G4)

Thank you for participating in this MCCAP survey. As a municipal stakeholder, your feedback is important. This survey consists of multiple choice and ranking-type questions developed from data gathered in 4 MCCAP focus groups and 10 interviews conducted in September 2014. The purpose of this survey is to further verify and validate existing research findings while providing opportunities for municipal stakeholders to share knowledge and provide feedback with respect to the MCCAP planning process and next steps. All responses are anonymous, confidential and voluntary. If you have questions or for further information, please feel free to contact Brennan Vogel at [REDACTED] Principal Investigator Dr. Gordon McBean at [REDACTED]

Please provide your occupational information (19/26)

Occupation	Municipality	Years of Employment in this Position
Economic Development	Town of New Glasgow	5
Municipal Councillor	District of Lunenburg	7
Municipal Engineer	District of Shelburne	6
Planner	Region of Queens	16
Councillor (elected)	District of Lunenburg	7
Development Officer	Chester	1.5
Chief Administrative Officer	Town of Stewiacke, NS	15
Planner	Colchester	30
Director of Planning & Building Services	Town of Antigonish	2002
Planner (Director)	Municipality of the District of Chester	5
Planner	Town of Amherst	5
Councilor	Cumberland	3
councillor	county of Antigonish	2.5
Councillor	Town of Amherst	3
Planner	Kings	10
Planner	Town of Bridgewater	7
Planner	District of Lunenburg	
Deputy CAO	Amherst	2
Town Planner	Towns of Trenton, Stellarton and Westville	12

Setting the agenda, framing the problem, formulating options and developing adaptation priorities

The following factors are understood to be the main 'enabling conditions' behind the MCCAP policy and planning exercise:

- The Gas Tax providing an economic incentive for adaptation planning
- Experience with historical damages from storms
- Regional collaboration on emergency preparedness planning
- Building on existing ICSP sustainability planning initiatives
- Provincial, academic and non-governmental planning and policy-making capacity-building and support

To what extent do you agree with this assessment of the 'enabling conditions' that led to MCCAP? (22/26)

Strongly agree: 40.9% (9)

Agree: 54.6% (12)

Strongly disagree: 4.6% (1)

Which factors were influential in initiating and/or framing your MCCAP? Please check all of the factors that applied to initiating and/or framing your MCCAP preparation. (22/26)

Gas tax: 86.4% (19)

Historical focusing events: 72.7% (16)

Regional municipal and emergency measures collaboration: 36.4% (8)

Building on the ICSP: 45.5% (10)

Provincial capacity building resources: 50% (11)

Academic collaboration: 54.6% (12)

Outside consultants: 13.6% (3)

Local champions and public support: 18.2% (4)

Other: 4.6% (1)

Please rank the importance of each of these factors to initiating and/or framing your MCCAP (1 = top importance, 8 = least importance or n/a).

Gas tax (22/26)

Very important: 81.8% (18)

Somewhat important: 4.6% (1)

Neutral: 9.1% (2)

Historical focusing events (22/26)

Very important: 36.4% (8)

Somewhat important: 45.5% (10)

Neutral: 9.1% (2)

Not important: 4.6% (1)

N/A: 4.6% (1)

Regional municipal and emergency measures collaboration (22/26)

Very important: 27.3% (6)

Somewhat important: 22.7% (5)

Neutral: 18.2% (4)

Somewhat unimportant: 4.6% (1)

Not important: 9.1% (1)

N/A: 18.2% (4)

Building on the ICSP (22/26)

Very important: 13.6% (3)

Somewhat important: 36.4% (8)

Neutral: 18.2% (4)

Somewhat unimportant: 13.6% (3)

Not important: 9.1% (2)

N/A: 9.1% (2)

Provincial capacity building resources and tools (22/26)

Very important: 13.6% (3)

Somewhat important: 36.4% (8)

Neutral: 31.8% (7)

Somewhat unimportant: 4.6% (1)

Not important: 4.6% (1)

N/A: 9.1% (2)

Academic collaboration (22/26)

Very important: 27.3% (6)

Somewhat important: 36.4% (8)

Neutral: 9.1% (2)

Somewhat unimportant: 9.1% (2)

Not important: 9.1% (2)

N/A: 9.1% (2)

Outside consultants collaboration (22/26)

Very important: 22.7% (5)

Somewhat important: 22.7% (5)

Neutral: 18.2% (4)

Somewhat unimportant: 0% (0)

Not important: 22.7% (5)

N/A: 13.6% (3)

Local champions and public support (22/26)

Very important: 18.2% (4)

Somewhat important: 18.2% (4)

Neutral: 31.8% (7)

Somewhat unimportant: 9.1% (2)

Not important: 13.6% (3)

N/A: 9.1% (2)

Which techniques did you use to identify risks and prioritize actions when preparing your MCCAP? Please check all that applied in your MCCAP process. (22/26)

Consultation with landowners and businesses to identify and document existing climate risks and impacts in the community: 36.4% (8)

Collaboration with a consultant in hazard risk vulnerability assessment and risk prioritization for adaptation and/or emergency response planning: 40.9% (9)

Staff capacity-building through attendance and participation at municipally-focused meetings, conferences, workshops, and/or webinars (etc.) on topics of climate risk and adaptation planning 81.8% (18)

Emulation of climate risk and adaptation planning and policy approaches adopted elsewhere (ex. HRM ClimateSMART, Annapolis Royal flood- risk planning etc.) 31.8% (7)

Participation in national and/or international municipal climate change programs (ex. ICLEI, FCM-PCP etc.) 9.1% (2)

Provincial policy and planning resources, engagement and/or support 68.2% (15)

Federal policy and planning resources, engagement and/or support 22.7% (5)

Academic research collaboration and support 68.2% (15)

Other (please specify) 9.1%

Engaging stakeholders and the public in the MCCAP policy-making, planning and prioritization process

Please check all the types of stakeholder consultation that applied to the preparation of your MCCAP. (20/26)

Internally with municipal staff (Staff, Planning, Engineering and/or Public Works, Maintenance, Recreation, Protective Services) 95% (19)

Internally with municipal council (Councilors and Mayors/Wardens) 75% (15)

Externally with relevant municipal stakeholders (Regional Planning Commissions, Regional Emergency Management Organizations, Neighboring Municipalities) 80% (16)

Externally with First Nations 0% (0)

Externally with Academics, Consultants and/or NGOs 70% (14)

Externally with Emergency Service or Housing Providers involved in responding to climate change events (ex. Local Schools, Housing Agencies (ex. Seniors facilities), Social Service Agencies (ex. Red Cross), Special Needs / Vulnerable Groups) 25% (5)

Externally with the Provincial government (ex. Dept of Municipal Affairs, Dept of Environment, Dept of Natural Resources, Dept of Agriculture) 75% (15)

Externally with the Federal government (ex. Public Safety Canada, Infrastructure Canada, Environment Canada, Natural Resources Canada) 15% (3)

Externally with Private industry (ex. Fishing industry, Forestry industry, Agricultural industry, NS Power and other utilities Other (please specify) 20% (4)

Other 10% (2)

Public participation: Please indicate the level of public participation that occurred in the preparation of the MCCAP in your municipality. (20/26)

High level: there was considerable public consultation (ex. surveys, presentations, focus groups, promotions, websites, public representation on committee, open meetings) in order to promote public awareness and knowledge of climate risk issues in the community and to document existing risks and hazards 0% (0)

Medium level: there was some level of public consultation in the preparation of the MCCAP, however public participation was constrained by limited time, capacity-resources and/or limited public interest 50% (10)

Low level: there was little to no public consultation in the preparation of the MCCAP because it was not required and/or; there were concerns over publicly providing information that may raise public expectations or alarm the public and/or; the ICSP process gathered the public opinion necessary for the MCCAP 15% (3)

Other (please specify)

MCCAP content analysis (Reeves, 2014) indicated that the majority of Nova Scotia municipalities perceive themselves to be at a high risk due to climate impacts (67% at high risk from hurricanes and high winds, 61% at high risk from in-land flooding and heavy precipitation and 60% at high risk of storm surge and sea-level rise). How were MCCAP priorities set? In making your climate risk/impact priority determination, please check all planning mechanisms that applied (20/26)

Hazard, risk and vulnerability assessment criteria development 70% (14)

Hazard, risk and vulnerability assessment ranking/rating systems 75% (15)

Risk tolerance matrices 30% (6)

Committee round table discussions 80% (16)

Staff knowledge and input 95% (19)

Council knowledge and input 55% (11)

Flood risk mapping and visualization (ex. LiDAR mapping) 70% (14)

Asset mapping and risk assessment 70% (14)

Consultation with other levels of government 40% (8)

Consultation with researchers and experts 45% (9)

Consultation with businesses and industry 5% (1)

Community consultation 25% (5)

Other (please specify) 10% (2)

When determining climate risk priorities, which criteria were considered? Check all that apply. (20/26)

Public safety priorities 85% (17)

Critical infrastructure concerns 95% (19)

Responding to an increased awareness of proximity to climate change hazards (e.g. storm surge, erosion, inland flooding) 80% (16)

Responding to the identification of cross-jurisdictional policy concerns (shared inter-municipal and/or inter-governmental policy jurisdictions such as coastal management etc.) 60% (12)

Cost/benefit analysis 55% (11)

Other (please specify) 5% (1)

Please rank the following criteria used to determining climate risk priorities (1=top importance 5=least importance or n/a):

Public safety priorities (20/26)

Very important: 80% (16)

Somewhat important: 15% (3)

Neutral: % ()

Somewhat unimportant: % ()

Not important: % ()

N/A: 5% (1)

Critical infrastructure concerns (20/26)

Very important: 85% (16)

Somewhat important: 10% (2)

Neutral: % ()

Somewhat unimportant: % ()

Not important: % ()

N/A: 5% (1)

Responding to an increased awareness of proximity to climate change hazards (e.g. storm surge, erosion, inland flooding) (20/26)

Very important: 40% (8)

Somewhat important: 35% (7)

Neutral: 15% (3)

Somewhat unimportant: % ()

Not important: % ()

N/A: 10% (2)

Responding to the identification of cross-jurisdictional policy concerns (shared inter-municipal and/or inter-governmental policy jurisdictions such as coastal management etc.) (20/26)

Very important: 25% (16)

Somewhat important: 50% (2)

Neutral: 10% (2)

Somewhat unimportant: 10% (2)

Not important: % ()

N/A: 5% (1)

Cost/benefit analysis (20/26)

Very important: 20% (4)

Somewhat important: 50% (10)

Neutral: 20% (4)

Somewhat unimportant: 10% (2)

Not important: 5% (1)

N/A: 5% (1)

Below is a summary of the adaptation priorities noted in four regional MCCAPs. Please check the priorities that also apply to your municipality and if your municipality noted other top adaptation priorities, please specify in the 'Other' box. (19/26)

Flood elevation planning and integration into municipal land-use planning and regulations: 84.2% (16)

Flood elevation planning and integration into provincial land-use planning and regulations: 36.8% (7)

Inter-governmental collaboration on issues of policy jurisdiction and coastal risk management: 52.6% (10)

Multi-stakeholder collaboration on mapping and weather data access: 47.4% (9)

Regional municipal collaboration on infrastructure funding and provisions: 26.3% (5)

Regional municipal collaboration on

emergency measures planning and response: 78.9% (15)

Regional municipal collaboration on land-use planning regulatory uniformity and reform: 21.1% (4)

Collaborative approaches for ongoing public awareness and education about climate change adaptation and disaster risk reduction at the regional scale: 52.6% (10)

Long-term integrated approaches to addressing climate risks related to water resources at the regional scale: 42.1% (8)

Community-based approaches to tracking climate change impacts: 21.1% (4)

Other (please specify): 21.1% (4)

What follow-up has occurred in your municipality since the MCCAP was completed? Check all that apply: (19/26)

A MCCAP Action Committee has been re-established to continue MCCAP progress and implementation 26.3% (5)

Municipal efforts on coastal zone management are occurring to address risks: 31.6% (6)

Inter-governmental collaboration on MCCAP priorities is occurring (either on an ad-hoc or formal basis): 10.5% (2)

MCCAP integration into municipal decision-making and planning processes has occurred or is occurring either informally (or formally) 84.2% (16)

Little or no follow up has occurred due to low levels of political interest, lack of internal expertise and/or lack of designated capacity-funding resources 15.8% (3)

Other (please specify):

Generating political support for adaptation policy development

Political leadership and support is important for inter-departmental staff motivation and collaboration on MCCAP priorities implementation (ex. Land-use planning strategic reviews, integrating MCCAP priorities into infrastructure and asset management). (19/26)

Strongly disagree:

Disagree: 5.3%

Undecided: 0%

Agree: 42.1%

Strongly Agree: 52.6%

N/A:

Political leadership and support is important for collaboration with staff on MCCAP priorities implementation through capital infrastructure planning and annual budgeting processes. (19/26)

Strongly disagree:

Disagree: 0%

Undecided: 0%

Agree: 36.8%

Strongly Agree: 63.2%

N/A:

Political leadership and support is important for supporting public education and awareness-raising initiatives to reduce climate risks and increase resilience to climate impacts in municipalities. (19/26)

Strongly disagree:

Disagree: 0%

Undecided: 0%

Agree: 63.2%

Strongly Agree: 36.8%

N/A:

Political leadership and support is important for inter-municipal collaboration on MCCAP priorities through regional emergency measures organizations and/or clarifying shared responsibilities on integrated climate risk reduction through infrastructure and land-use planning (19/26)

Strongly disagree:

Disagree: 5.3%

Undecided: 0%

Agree: 31.6%

Strongly Agree: 63.2%

N/A:

Policy integration

Some municipalities collaborated with neighboring municipalities when preparing their MCCAP. Regional integration seems important due to shared climate hazards and opportunities for improving responses at the regional scale. Please indicate below which aspects of regional integration you believe are important for MCCAP implementation (1=high importance 6=low importance or n/a).

Ensuring that the adaptation and mitigation planning and policy objectives were considered during municipal budgeting and Capital Investment Plan preparation (19/19)

1: 42.1% (8)

2: 21.1% (4)

3: 21.1% (4)

4: 5.3% (1)

5: 5.3% (1)

6: 0% (0)

n/a: 5.3% (1)

Ensuring regional emergency measures organizations integrate MCCAP information in emergency preparedness and response planning (13/19)

1: 54.9% (7)

2: 23.1% (3)

3: 7.7% (1)

4: 0% (0)

5: 0% (0)

6: 15.4% (0)

n/a: 0% (0)

Developing planning regulatory uniformity across municipal boundaries, to ensure common standards for impact risk mitigation (14/19)

1: 7.1% (1)

2: 28.6% (4)

3: 7.1% (1)

4: 35.7% (5)

5: 7.1% (1)

6: 0% (0)

n/a: 14.3% (0)

Sharing consultation services between municipalities on common adaptation priorities of interest (9/19)

1: 0% (0)

2: 33.3% (3)

3: 11.1% (1)

4: 33.3% (3)

5: 22.2% (2)

6: 0% (0)

n/a: 0% (0)

Sharing participation in academic research and/or NGO projects on common adaptation priorities of interest (13/19)

1: 7.7% (1)

2: 15.4% (2)

3: 30.8% (4)

4: 15.4% (2)

5: 15.4% (2)

6: 15.4% (2)

n/a: 0% (0)

Developing shared service agreements to adapt vulnerable infrastructure and share costs of upgrades, replacements, improvements and/or further developments required to mitigate against coastal risks (12/19)

1: 0% (0)

2: 16.7% (2)

3: 16.7% (2)

4: 16.7% (2)

5: 16.7% (2)

6: 16.7% (2)

n/a: 16.7% (2)

Integrating adaptation into municipal policies, plans and programs presents an important opportunity for the implementation of MCCAPs. Which of the following constraints pose a barrier to adaptation policy integration in your municipality? Check all that apply. (19/26)

Lack of dedicated staff time hinders action on MCCAP implementation priorities: 84.2% (16)

Lack of dedicated staff resources and/or expertise required for developing and implementing long-term adaptation and emergency measures plans 68.4% (13)

Lack of dedicated, designated and/or matched funding from other levels of government hinders action on MCCAP implementation priorities 89.5% (17)

Competing infrastructure priorities in an environment of scarce financial resources is problematic to advancing adaptation implementation priorities 89.5% (17)

Council engagement, political 'buy-in', 'will' and/or leadership/motivation is lacking which hinders action on MCCAP implementation priorities 68.4% (13)

A lack of public knowledge, desire and expectations to advocate for political leadership on MCCAP priorities hinders action on MCCAP implementation priorities 73.7% (14)

Other (please specify)

Please indicate your opinion about the following statements on the scale provided.

Lack of human resources and/or funding for capacity building are the top two barriers to overcome in bridging the gap between MCCAP preparation and implementation. (19/26)

Strongly disagree:

Disagree: 0%

Undecided: 10.5% (2)

Agree: 42.1% (8)

Strongly Agree: 47.4% (9)

Collaboration and/or clarification of inter-governmental legal responsibilities is required in order to facilitate better policy, planning and implementation of adaptation and emergency preparedness plans and strategies at regional and Provincial scales

(19/26)

Strongly disagree:

Disagree: 0%

Undecided: 10.5% (2)

Agree: 63.2% (12)

Strongly Agree: 26.3% (5)

Pursuing further stakeholder collaboration (ex. academia) and maximizing opportunities for education and outreach on climate public safety and risk reduction initiatives at the municipal level 19/26)

Strongly disagree:

Disagree: 5.3% (1)

Undecided: 26.3% (5)

Agree: 42.1% (8)

Strongly Agree: 26.3% (8)

N/A:

Capacity-building funding for staff and resources is required for cost-effectively progressing with the implementation of MCCAP priorities. For example, including in the Gas Tax agreement the provision to allow for hiring a municipal Adaptation and/or Sustainability Planning Specialist as an eligible capacity-building category (19/26)

Strongly disagree:

Disagree: 15.8% (3)

Undecided: %

Agree: 47.4% (9)

Strongly Agree: 36.8% (7)

Procuring the climate change related data required for better enabling MCCAP implementation priorities (e.g. LiDAR mapping, energy usage) (19/26)

Strongly disagree:

Disagree: 10.5% (2)

Undecided: 5.3% (1)

Agree: 52.6% (10)

Strongly Agree: 31.6% (6)

Developing and coordinating integrated regional land-use approaches for advancing long-term adaptation and emergency planning through regional emergency measures organizations and/or regional 'champions'

Strongly disagree:

Disagree: %

Undecided: 5.3% (1)

Agree: 52.6% (10)

Strongly Agree: 42.1% (8)

Integrating climate change considerations into municipal planning processes (work plans, capital plans and projects)

Strongly disagree:

Disagree: %

Undecided: %

Agree: 52.6% (10)

Strongly Agree: 47.4% (9)

Gauging the effectiveness and implementation progress of MCCAPs through Capital Investment Planning and staff reporting on MCCAP priorities through MCCAP 'Report Cards' or annual review processes

Strongly disagree:

Disagree: 15.8% (3)

Undecided: 26.3% (5)

Agree: 47.4% (9)

Strongly Agree: 10.5% (2)

Check all factors that apply in terms of your municipalities' information and knowledge gaps. Please rank the factors that apply in terms of your municipalities' information and knowledge gaps (1=high importance 5=low importance or n/a) (19/26)

Need for reliable funding and staff resources to enable knowledge and provide capacities required for making progress on MCCAP implementation and risk reduction (16/19) 84%

1: 56.3% (9)

2: 12.5% (2)

3: 12.5% (2)

4: 12.5% (2)

5: 6.3% (1)

N/A:

Need for more technical information including modeling, scenarios and mapping to local scales (15/19) 79%

1: 26.7% (4)

2: 26.7% (4)

3: 6.7% (4)

4: 6.7% (4)

5: 20% (3)

N/A: 13.3% (2)

Need for information on 'best practices', frameworks, case studies, including tools and processes, for adaptation policy and planning, including innovative financing options (15/19) 79%

1: 6.7% (1)

2: 26.7% (4)

3: 53.3% (8)

4:

5: 13.3% (2)

N/A:

Need for knowledge of methods for monitoring climate change impacts and assessing adaptation effectiveness at local scale (15/19) 79%

1: 6.7% (1)

2: 26.7% (4)

3: 53.4% (8)

4:

5: 33.3% (5)

N/A: 6.7% (1)

Need for knowledge of 'action planning' for flood management and coastal research on open space planning, (13/19)

2: 15.4% (2)

3: 15.4% (2)

4: 30.8% (4)

5: 23.1% (3)

N/A: 15.4% (2)

Thank you for your participation.

Appendix G4: Survey Screening Mechanism Results

Theme	Sub-theme	Survey Question	Response Rate	PRIORITIZATION SCREENING MECHANISM FOR ACROSS INDIVIDUAL -CASE ANALYSIS OF SOCIAL IMPACT FACTORS Survey Data (+75% agreement)
Initiation	Agenda-setting	<p>The following factors are understood to be the main 'enabling conditions' behind the MCCAP policy and planning exercise:</p> <p>The Gas Tax providing an economic incentive for adaptation planning</p> <p>Experience with historical damages from storms</p> <p>Regional collaboration on emergency preparedness planning</p> <p>Building on existing ICSP sustainability planning initiatives</p> <p>Provincial, academic and non-governmental planning and policy-making capacity-building and support</p> <p>To what extent do you agree with this assessment of the 'enabling conditions' that led to MCCAP?</p>	22	Strongly agree: 40.9% (9) Agree: 54.6% (12) Strongly disagree: 4.6% (1) = 21/22 (95.5%) agreement
Initiation	Agenda-setting & problem-framing	Which factors were influential in initiating and/or framing your MCCAP? Please check all of the factors that applied to initiating and/or framing your MCCAP preparation	22	Gas tax =19/22 (86.4%)
Initiation	Agenda-setting & problem-framing	Please rank the importance of each of these factors to initiating and/or framing your MCCAP (1 = top importance, 8 = least importance or n/a).	22	Gas tax Very important: 81.8% (18) Somewhat important: 4.6% (1) =19/22 (86.4%)

				<p>Historical focusing events</p> <p>Very important: 36.4% (8)</p> <p>Somewhat important: 45.5% (10)</p> <p>=18/22 (81.9%)</p>
Capacity-building	Policy formulation and risk prioritization	Which techniques did you use to identify risks and prioritize actions when preparing your MCCAP? Please check all that applied in your MCCAP process.	22	<p>Staff capacity-building through attendance and participation at municipally-focused meetings, conferences, workshops, and/or webinars (etc.) on topics of climate risk and adaptation planning 81.8% (18)</p>
Capacity-building	Policy formulation and risk prioritization	MCCAP content analysis (Reeves, 2014) indicated that the majority of Nova Scotia municipalities perceive themselves to be at a high risk due to climate impacts (67% at high risk from hurricanes and high winds, 61% at high risk from in-land flooding and heavy precipitation and 60% at high risk of storm surge and sea-level rise). How were MCCAP priorities set? In making your climate risk/impact priority determination, please check all planning mechanisms that applied	20	<p>Hazard, risk and vulnerability assessment ranking/rating systems 75% (15)</p> <p>Committee round table discussions 80% (16)</p> <p>Staff knowledge and input 95% (19)</p>
Capacity-building	Policy formulation and risk prioritization	11. When determining climate risk priorities, which criteria were considered? Check all that apply.	20	<p>Public safety priorities 85% (17)</p> <p>Critical infrastructure concerns 95% (19)</p> <p>Responding to an increased awareness of proximity to climate change hazards (e.g. storm surge, erosion, inland flooding) 80% (16)</p>
Capacity-building	Policy formulation and risk prioritization	Please rank the following criteria used to determining climate risk priorities (1=top importance 5=least importance or n/a)	20	<p>Public safety priorities</p> <p>Very important: 80% (16)</p> <p>Somewhat important: 15% (3)</p> <p>= 19/20 (95%)</p>

				<p>Critical infrastructure concerns</p> <p>Very important: 85% (16)</p> <p>Somewhat important: 10% (2)</p> <p>=18/20 (90%)</p> <p>Responding to an increased awareness of proximity to climate change hazards (e.g. storm surge, erosion, inland flooding)</p> <p>Very important: 40% (8)</p> <p>Somewhat important: 35% (7)</p> <p>= 15/20 (75%)</p>
Capacity-building	Policy formulation and risk prioritization	Below is a summary of the adaptation priorities noted in four regional MCCAPs. Please check the priorities that also apply to your municipality and if your municipality noted other top adaptation priorities, please specify in the 'Other' box.	19	<p>Flood elevation planning and integration into municipal land-use planning and regulations: 84.2% (16)</p> <p>Regional municipal collaboration on emergency measures planning and response: 78.9% (15)</p>
Integration	Stakeholder engagement and public participation	Please check all the types of stakeholder consultation that applied to the preparation of your MCCAP.	20	<p>Internally with municipal staff (Staff, Planning, Engineering and/or Public Works, Maintenance, Recreation, Protective Services) 95% (19)</p> <p>Internally with municipal council (Councilors and Mayors/Wardens) 75% (15)</p> <p>Externally with relevant municipal stakeholders (Regional Planning Commissions, Regional Emergency Management Organizations, Neighboring Municipalities) 80% (16)</p> <p>Externally with the Provincial government (ex. Dept of Municipal Affairs, Dept of Environment, Dept of Natural Resources, Dept of Agriculture) 75% (15)</p>
Integration	Stakeholder engagement	What follow-up has occurred in your municipality since the MCCAP was completed?	19	<p>MCCAP integration into municipal decision-making and planning processes has occurred or is occurring either informally (or formally) 84.2% (16)</p>
Integration	Public participation	Public participation: Please indicate the level of public participation that occurred in the	19	<p><i>Medium level:</i> there was some level of public consultation in the preparation of the MCCAP, however public participation was constrained by limited time, capacity-resources and/or limited public interest 50% (10)</p>

		preparation of the MCCAP in your municipality.		* Included to show survey opinion trends on public participation in MCCAP preparations
Integration	Stakeholder engagement	Some municipalities collaborated with neighboring municipalities when preparing their MCCAP. Regional integration seems important due to shared climate hazards and opportunities for improving responses at the regional scale. Please indicate below which aspects of regional integration you believe are important for MCCAP implementation (1=high importance 6=low importance or n/a).	19	<p>Ensuring that the adaptation and mitigation planning and policy objectives were considered during municipal budgeting and Capital Investment Plan preparation</p> <p>19/19 = 100%</p> <p>1: 42.1% (8)</p> <p>2: 21.1% (4)</p> <p>3: 21.1% (4)</p> <p>=84.3% importance</p>
Integration	Political support	Political leadership and support is important for inter-departmental staff motivation and collaboration on MCCAP priorities implementation (ex. Land-use planning strategic reviews, integrating MCCAP priorities into infrastructure and asset management).	19	<p>Agree: 42.1%</p> <p>Strongly Agree: 52.6%</p> <p>= 94.7% agreement</p>
Integration	Political support	Political leadership and support is important for collaboration with staff on MCCAP priorities implementation through capital infrastructure planning and annual budgeting processes. (19/26)	19	<p>Agree: 36.8%</p> <p>Strongly Agree: 63.2%</p> <p>= 100% agreement (19/19)</p>
Integration	Political support	Political leadership and support is important for supporting public education and awareness-raising initiatives to reduce climate risks and	19	<p>Agree: 63.2%</p> <p>Strongly Agree: 36.8%</p> <p>= 100% agreement (19/19)</p>

		increase resilience to climate impacts in municipalities.		
Integration	Political support	Political leadership and support is important for inter-municipal collaboration on MCCAP priorities through regional emergency measures organizations and/or clarifying shared responsibilities on integrated climate risk reduction through infrastructure and land-use planning	19	<p>Agree: 31.6%</p> <p>Strongly Agree: 63.2%</p> <p>= 95% agreement (18/19)</p>
Integration	Opportunities	Collaboration and/or clarification of inter-governmental legal responsibilities is required in order to facilitate better policy, planning and implementation of adaptation and emergency preparedness plans and strategies at regional and Provincial scales	19	<p>Agree: 63.2% (12)</p> <p>Strongly Agree: 26.3% (5)</p> <p>= 89.5% (17)</p>
Integration	Opportunities	Capacity-building funding for staff and resources is required for cost-effectively progressing with the implementation of MCCAP priorities. For example, including in the Gas Tax agreement the provision to allow for hiring a municipal Adaptation and/or Sustainability Planning Specialist as an eligible capacity-building category	19	<p>Agree: 47.4% (9)</p> <p>Strongly Agree: 36.8% (7)</p> <p>= 84.2% (17)</p>
Integration	Opportunities	Procuring the climate change related data required for better enabling MCCAP implementation priorities (e.g. LiDAR mapping, energy usage)	19	<p>Agree: 52.6% (10)</p> <p>Strongly Agree: 31.6% (6)</p> <p>= 84.2% (16)</p>

Integration	Opportunities	Developing and coordinating integrated regional land-use approaches for advancing long-term adaptation and emergency planning through regional emergency measures organizations and/or regional 'champions'	19	<p>Agree: 52.6% (10)</p> <p>Strongly Agree: 42.1% (8)</p> <p>= 94.7% (18)</p>
Integration	Opportunities	Integrating climate change considerations into municipal planning processes (work plans, capital plans and projects)	19	<p>Agree: 52.6% (10)</p> <p>Strongly Agree: 47.4% (9)</p> <p>= 100%</p>
Integration	Barriers	Check all factors that apply in terms of your municipalities' information and knowledge gaps. Please rank the factors that apply in terms of your municipalities' information and knowledge gaps (1=high importance 5=low importance or n/a)	19	<p>Need for reliable funding and staff resources to enable knowledge and provide capacities required for making progress on MCCAP implementation and risk reduction (16/19) 84%</p> <p>1: 56.3% (9)</p> <p>2: 12.5% (2)</p> <p>3: 12.5% (2)</p> <p>= 13/16 (81.3%)</p> <p>Need for more technical information including modeling, scenarios and mapping to local scales (15/19) 79%</p> <p>1: 26.7% (4)</p> <p>2: 26.7% (4)</p> <p>3: 6.7% (4)</p> <p>= 16/16 (100%)</p> <p>Need for information on 'best practices', frameworks, case studies, including tools and processes, for adaptation policy and planning, including innovative financing options (15/19) 79%</p> <p>1: 6.7% (1)</p> <p>2: 26.7% (4)</p> <p>3: 53.3% (8)</p> <p>= 13/15 (86.7%)</p> <p>Need for knowledge of methods for monitoring climate change impacts and assessing adaptation effectiveness at local scale (15/19) 79%</p> <p>1: 6.7% (1)</p>

				<p>2: 26.7% (4)</p> <p>3: 53.4% (8)</p> <p>=13/15 (86.7%)</p>
Integration	Barriers	Integrating adaptation into municipal policies, plans and programs presents an important opportunity for the implementation of MCCAPs. Which of the following constraints pose a barrier to adaptation policy integration in your municipality? Check all that apply.	19	<p>Lack of dedicated staff time hinders action on MCCAP implementation priorities: 84.2% (16)</p> <p>Lack of dedicated, designated and/or matched funding from other levels of government hinders action on MCCAP implementation priorities 89.5% (17)</p> <p>Competing infrastructure priorities in an environment of scarce financial resources is problematic to advancing adaptation implementation priorities 89.5% (17)</p>
Integration	Barriers	Lack of human resources and/or funding for capacity building are the top two barriers to overcome in bridging the gap between MCCAP preparation and implementation.	19	<p>Agree: 42.1% (8)</p> <p>Strongly Agree: 47.4% (9)</p> <p>= 89.5% (17)</p>

Appendix H1: Conceptual Propositions and MCCAP Evidence

CONCEPTUAL PROPOSITIONS		MCCAP EVIDENCE			
<p>INITIATION: Adaptation policy initiation through multi level governance can act as a critical pre-condition for the initiation of adaptation policies and plans in municipalities</p> <p>*There is a notable role for place-based focusing events to influence the adaptation policy making agenda setting and problem framing process in multi-level adaptation governance contexts</p>		<p>Content Analysis</p> <p>Mandatory completion of the MCCAP occurred in 51 municipalities of a possible 53. Widespread evidence of the Gas Tax incentive was identified using search text queries (Appendix B4). Appendix B2 provides evidence that problem framing related to the aversion of future costs, through proactive adaptation efforts. Historic impacts of storms and damages are also evident in MCCAP documents content.</p>	<p>Focus Groups</p> <p>18/19 of focus group participants agreed that the gas tax was the number one driver for the completion of the MCCAP, with 15/19 reporting that the MCCAP was unlikely to have occurred without the financial incentive.</p>	<p>Online Survey</p> <p>19/22 participants agreed that the gas tax was the most important factor for setting the municipal adaptation agenda for the MCCAP completion. 18/20 reported that historical focusing events were also important for initiating/framing the MCCAP adaptation planning process.</p>	<p>Interviews</p> <p>10/10 interviewees unanimously confirmed that the monetization of adaptation planning was instrumental for the completion of the MCCAP. 4/4 non-municipal respondents discussed how the MCCAP mandate linking a regulatory requirement and financial incentive was influential to adaptation planning initiation. 2/3 municipalities and 4/4 non-municipal interviewees discussed focusing events and staff capacity impacting the MCCAP process</p>
		<p>Content Analysis</p> <p>11/22 MCCAPs were prepared using consultant collaboration, while 8/22 used academic collaboration. Appendix B2 provides evidence of a provincial capacity building resource (e.g., MCCAP guidebook and six step planning framework). Public participation was not required in the MCCAP framework.</p>	<p>Focus Groups</p> <p>20/20 identified vertical collaboration with the provincial government in preparing the MCCAP. 2/20 identified vertical collaboration with the federal government in preparing the MCCAP. 8/20 described vertical collaboration as positive. 8/20 described vertical collaboration as negative. 12/20 reported internal staff collaboration to develop the MCCAP. 8/20 reported staff-council collaboration to prepare the MCCAP. 7/20 identified the MCCAP template as the basis for MCCAP and 3/20 identified external consultants as the basis for MCCAP preparation. 7/21 identified regional emergency measures organization as a means of horizontal collaboration. 10/19 identified academic research collaboration and 3/21 identified non-governmental MCCAP facilitation providing resources, information and expertise. 13/20 identified stakeholder collaboration; 7/20 identified public participation occurred and 7/20 identified that public participation did not occur.</p>	<p>Online Survey</p> <p>18/22 reported staff capacity building with external support as the top planning technique to identify and prioritize actions in the MCCAP. 19/20 identified staff knowledge and input was used to develop priorities; 16/20 reported committee round-table discussions to develop priorities; 15/20 reported risk assessment mechanisms (e.g., HRVA) were used to develop adaptation priorities.</p>	<p>Interviews</p> <p>3/3 municipalities used the MCCAP guidebook; 2/3 municipalities used academic collaborations to prepare the MCCAP; 2/3 used HRVA; 1/3 municipalities used a consultant. 4/4 non-municipal interviewees discussed the importance of provincial, non-governmental, academic and consulting collaborations as influences on raising capacities for municipal adaptation planning</p>
<p>CAPACITY-BUILDING: The provision of capacity-building resources through multi-level governance can serve as a key factor for enabling and supporting municipalities' tasked with adaptation policy and planning.</p> <p>* External collaborations with consultants, academics enable municipal capacity-building.</p> <p>** Vertical governance barriers constrain municipal capacity building.</p> <p>*** Horizontal regional collaboration enables municipal capacity-building.</p> <p>**** Internal staff capacity enables institutional adaptive capacity.</p>					

INTEGRATION: Adaptation policy and planning implementation in municipalities can be enabled via both the conditional and sustained provision of capacity building resources, provided through multi level governance approaches	Content Analysis 2/12 priorities in 4 regional MCCAPs collaboratively prepared by 12 municipalities (Appendix G2) indicate opportunities for licensing and regulation to integrate adaptation into flood elevation planning and land use bylaws, strategies and regulations. 8/12 priorities in 4 regional MCCAPs collaboratively prepared by 12 municipalities indicate opportunities for facilitation, advocacy, leadership and public education to address issues associated with inter-governmental collaboration, policy jurisdiction, access to information, access to funding, horizontal emergency planning collaboration and land use planning reform, and public education on climate adaptation and emergency preparedness. 2/12 priorities in 4 regional MCCAPs collaboratively prepared by 12 municipalities indicate opportunities for community development and civic engagement, to take long-term integrated approaches to reduce climate risks to water resources while improving community-based approaches for impact tracking.	Online Survey 19/20 identified internal municipal collaboration used important to integration; 16/20 identified horizontal municipal collaboration important to integration; 15/20 reported vertical collaboration with provincial departments; 16/19 reported integration occurring informally or formally; 19/19 reported individual and regional integration of MCCAP into budgeting and capital planning was a key social impact factor for integration and implementation; 17/19 reported lack of funding from higher government for implementation; 17/19 municipal fiscal austerity problematized MCCAP implementation actions; 17/19 lack of staff and funding top two barriers to overcome in bridging gap between adaptation planning and implementation; 16/19 reported a need for reliable funding and staff resources to enable knowledge and capacity for progress on implementing actions to reducing climate impact risks; 16/19 reported lack of dedicated staff time was a barrier to integration; 15/19 reported need for climate models, scenarios and mapping to local scales as barrier (15/15 medium-high priority); 15/19 reported need for best practices, frameworks, case studies, tools and processes for enabling adaptation policy and planning including financing options and methods of monitoring and assessing adaptation intervention effectiveness; 19/19 reported opportunity to integrate adaptation into planning processes (work plans, capital plans, project plans); 18/19 reported opportunity for regional land-use coordination to advance risk reduction through regional land-use and emergency management operations and regulation processes; 17/19 reported opportunity for collaboration and clarification of inter-governmental legal responsibilities to facilitate better policy, planning and implementation of adaptation and emergency plans and strategies at regional and provincial scales; 17/19 reported need for capacity-building funding and staff resources to cost-effectively implement adaptation priorities, including through allowing sustainability planning specialist positions to be considered an eligible capacity-building allowance in the Canada-Nova Scotia gas tax municipal funding transfer agreement (Appendix H1); 16/19 reported opportunity for better access to provincially administered mapping and energy data to facilitate local climate change actions to reduce climate risks and mitigate greenhouse gas emissions; 19/19 reported political leadership at the local scale is important for integration because: i) municipal efforts to integrate rely on political leadership and support for adaptation priorities; ii) integrating adaptation priorities requires political approval in capital infrastructure planning and budgeting processes; iii) improving public support for adapting to climate change requires political leadership; 18/19 political leadership important for facilitating horizontal collaboration on regional adaptation priorities and actions
Focus Groups 10/21 identified shared interests in infrastructure and planning as reasons for horizontal collaboration with neighboring municipalities. 4/21 identified historical relationships and divergent interests as inter-municipal barriers to collaboration. 12/21 identified roles for academia to support MCCAP integration by providing outside expertise to aid with facilitating the implementation of adaptation actions. 3 participants reported political leadership on adaptation, as ongoing, needed for integration and necessary for success. 12/22 reported capacity constraints as the top barrier hindering implementation. 12/22 cited lack of funding from higher levels of government as a barrier. 7/22 reported better access to information as an opportunity for integration. 5/22 reported opportunities for regional emergency planning and adaptation integration. 4/22 reported integrating adaptation into municipal budgeting as an opportunity. Multi-level institutional fragmentation and poor coordination and lack of public awareness as key barriers. Multi-level institutional coordination on clarifying jurisdictional responsibility and providing support for capacity building to facilitate MCCAP implementation were reported as opportunities. Monitoring and evaluation were reported as mechanisms for multi-level governance supporting implementation.	Interviews Table Nine. 3/3 municipalities reported horizontal collaborations; 1/3 exhibited added staff capacity of a sustainability planner to facilitate external collaborations with academia, regional neighbors, internal departments and community stakeholders, including the public. 1/3 no public engagement; 1/3 public stakeholders on MCCAP committee; 1/3 public engagement. 3/3 reported issues with inter-departmental communication silos at provincial level; 7/10 interviewees reported issues with vertical institutional fragmentation in Canadian multi-level climate change governance, including at the provincial and federal scales; Public demand and political support ; integrating adaptation into capital investment budget planning; 3/3 federal leadership important for setting and coordinating a national policy agenda and resource distribution regime to address climate change at provincial and regional scales, in collaboration with municipalities to integrate climate change actions at the local scale; 4/4 non-municipal stakeholders discussed lack of funding, lack of staff capacity, lack of information and skills to make use of information at the municipal level as barriers to integration; 3/3 municipalities reported opportunities for better funding and capacity support from higher government; 3/3 reported opportunities for horizontal collaboration and engagement on regional climate risk reduction initiatives; 3/3 reported opportunities for internal institutional adaptive capacity building via external jurisdictional clarifications in multi-level adaptation governance contexts; 2/3 reported opportunities for using adaptation implementation monitoring and evaluation reporting mechanisms to socialize climate change adaptation values, norms and expectations in municipal government staff and political relations and municipal operational protocols and regulatory processes; 4/4 non-municipal stakeholders identified opportunities for provincial leadership to support institutional adaptive capacity building in municipalities via coordination of adaptation policy agendas, resources and clarifications of inter-jurisdictional responsibilities; 4/4 discussed opportunities for federal government leadership on climate change adaptation policy coordination; 10/10 interviewees reported social benefits and institutional capacity building enabled by the MCCAP policy making process at inter-related provincial and municipal governance scales, importantly including needs for integrated coastal zone management and flood elevation planning in provincial and municipal land-use planning strategies; 6/10 interviewees discussed staff/political knowledge to make use of climate change information as most important social factor integrating adaptation; 3/10 identified CAOs as 'staff champions'; 3/10 discussed dedicated sustainability planners as 'change agents'; Planners, infrastructure managers, emergency management coordinators also identified as 'adaptation facilitators'	
*Multi-level adaptation governance coordination, facilitation and leadership is required to address municipal adaptation issues. Institutional fragmentation is associated with problems of inter-governmental collaboration, policy jurisdiction, access to information, access to funding, horizontal emergency planning collaboration and coordinated coastal land use planning reform, and need for increasing public education on climate adaptation and emergency preparedness to reduce vulnerability to climate impacts at the local scale where storms, surges and sea-level rise manifest.		

Appendix I1: Nova Scotia-Canada Gas Tax Agreement 2014-2024 (Schedule B&C)

SCHEDULE B – Eligible Project Categories

Eligible Projects include investments in Infrastructure for its construction, renewal or material enhancement in each of the following categories:

- Local roads and bridges—roads, bridges and active transportation infrastructure (active transportation refers to investments that support active methods of travel. This can include: cycling lanes and paths, sidewalks, hiking and walking trails).
- Highways—highway infrastructure.
- Short-sea shipping—infrastructure related to the movement of cargo and passengers around the coast and on inland waterways, without directly crossing an ocean.
- Short-line rail—railway related infrastructure for carriage of passengers or freight.
- Regional and local airports—airport-related infrastructure (excludes the National Airport System).
- Broad band connectivity—infrastructure that provides internet access to residents, businesses, and/or institutions in Canadian communities.
- Public transit—infrastructure that supports a shared passenger transport system which is available for public use.
- Drinking water—infrastructure that supports drinking water conservation, collection, treatment and distribution systems.
- Wastewater—infrastructure that supports wastewater and storm-water collection, treatment and management systems.

10.Solid waste – infrastructure that supports solid waste management systems including the collection, diversion and disposal of recyclables, compostable materials and garbage.

11.Community energy systems – infrastructure that generates or increases the efficient usage of energy.

12.Brownfield Redevelopment – remediation or decontamination and redevelopment of a brownfield site within municipal boundaries, where the redevelopment includes:

the construction of public infrastructure as identified in the context of any other category under the GTF, and/or;

the construction of municipal use public parks and publicly-owned social housing.

13.Sport Infrastructure – amateur sport infrastructure (excludes facilities, including arenas, which would be used as the home of professional sports teams or major junior hockey teams (e.g., Junior A)).

14.Recreational Infrastructure – recreational facilities or networks.

15.Cultural Infrastructure – infrastructure that supports arts, humanities, and heritage.

16.Tourism Infrastructure – infrastructure that attract travelers for recreation, leisure, business or other purposes.

17. Disaster mitigation – infrastructure that reduces or eliminates long-term impacts and risks associated with natural disasters.

18. Capacity building – includes investments related to strengthening the ability of Municipalities to develop long-term planning practices. [emphasis added]

Note: Investments in health infrastructure (hospitals, convalescent and senior centres) are not eligible.

SCHEDULE C – Eligible and Ineligible Expenditures

1. Eligible Expenditures

1.1 Eligible Expenditures of Ultimate Recipients will be limited to the following:

- . a) the expenditures associated with acquiring, planning, designing, constructing or renovating a tangible capital asset, as defined by Generally Accepted Accounting Principles (GAAP), and any related debt financing charges specifically identified with that asset;
- . b) *for capacity building category only, the expenditures related to strengthening the ability of Municipalities to improve local and regional planning including capital investment plans, integrated community sustainability plans, life-cycle cost assessments, and Asset management Plans. The expenditures could include developing and implementing:*
 - i. *studies, strategies, or systems related to asset management, which may include software acquisition and implementation;*
 - ii. *training directly related to asset management planning; and,*
 - iii. *long-term infrastructure plans. [emphasis added]*
- . c) the expenditures directly associated with joint communication activities and with federal project signage for GTF-funded projects.

1.2 Employee and Equipment Costs: The incremental costs of the Ultimate Recipient's employees or leasing of equipment may be included as Eligible Expenditures under the following conditions:

- . a) the Ultimate Recipient is able to demonstrate that it is not economically feasible to tender a contract;
- . b) the employee or equipment is engaged directly in respect of the work that would have been the subject of the contract; and,
- . c) the arrangement is approved in advance and in writing by Nova Scotia.

1.3 Administration expenses of Nova Scotia related to program delivery and implementation of this Administrative agreement, in accordance with Section 5 (Administration Expenses) of Annex B (Terms and Conditions).

2. Ineligible Expenditures

The following are deemed Ineligible Expenditures:

- . a) project expenditures incurred before April 1, 2005;
- . b) project expenditures incurred before April 1, 2014 for the following investment categories:

- i. highways;
- ii. regional and local airports;
- iii. short-line rail;
- iv. short-sea shipping;
- v. disaster mitigation;
- vi. broadband connectivity;
- vii. brownfield redevelopment;
- viii. cultural infrastructure;
- ix. tourism infrastructure;
- x. sport infrastructure; and
- xi. recreational infrastructure.

c) the cost of leasing of equipment by the Ultimate Recipient, any over head costs, including salaries and other employment benefits of any employees of the Ultimate Recipient, its direct or indirect operating or administrative costs of Ultimate Recipients, and more specifically its costs related to planning, engineering, architecture, supervision, management and other activities normally carried out by its staff, except in accordance with Eligible Expenditures above; [emphasis added]

- . d) taxes for which the Ultimate Recipient is eligible for a tax rebate and all other costs eligible for rebates;
- . e) purchase of land or any interest therein, and related costs;
- . f) legal fees; and
- . g) routine repair and maintenance costs.

Curriculum Vitae

Name: Brennan Vogel

**Post-secondary
Education and
Degrees:** University of Waterloo
Waterloo, Ontario, Canada
1998-2003 B.E.S. (Honors, Co-Op)

Saint Mary's University
Halifax, Nova Scotia, Canada
2006-2010 M.A.

University of Western Ontario
London, Ontario, Canada
2012-2016 Ph.D.

**Honours and
Awards:** Ontario Graduate Scholarship
School of Graduate and Post-doctoral Studies
2015

NCE-MEOPAR Partnership Development Research Grant
Department of Oceanography, Dalhousie University
2014-2015

Social Science and Humanities Research Council (SSHRC)
Insight Development Grant / Research Assistantship
Dr. Daniel Henstra, University of Waterloo
2013-2014

Departmental Graduate Fellowship
University of Western Ontario
2012-2015

Social Science and Humanities Research Council (SSHRC)
Canada Graduate Scholarship
Saint Mary's University
2007-2008

International Mobility Award
Saint Mary's University
2007

JR Coutts Students Without Borders Award
University of Waterloo
2002

**Related Work
Experience**

Research Assistant
University of Western Ontario
2013-2015

Undergraduate Teaching Assistant
University of Western Ontario
2012

Research Assistant
Gorsebrook Research Institute Centre
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Publications:

Vogel, B., Henstra, D. (2015). Studying local climate change adaptation: a framework for comparative policy analysis. *Global environmental change*: 31, 110–120.

Vogel, B., McBean, G. (2015). Adapting to climate change: Local governance, municipal policy and planning in Nova Scotia, Canada. *International society for integrated disaster risk management (IDRIM)*. (Submitted).

Vogel, B. (2011). Adaptive capacity, climate change & development equity: a critical analysis of Canada's approach to international cooperation. [Saint Mary's University: Masters Thesis]. Ottawa: Library and Archives Canada. pp. 1-298