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The Governance of Climate Change Adaptation in Canada: Two Multilevel Case Studies

Daniel J. Bednar, *The University of Western Ontario*

Supervisor: McBean, Gordon, *The University of Western Ontario*
Co-Supervisor: Shrubsole, Dan, *The University of Western Ontario*
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Abstract

Anthropogenic climate change is affecting, and will continue to affect, communities across Canada. From increased average temperatures and alterations of seasonal precipitation patterns, to extreme rainfall and heat events, Canadians face a 21st century environment significantly different from that of the past. With risks to people and services identified via the global scientific and social science literature, the need to adapt to climate change is pressing. Climate change adaptation includes the identification of climate impacts in order to develop interventions into systems and services so to avoid negative effects and recognize opportunities. The emerging consensus is that climate change adaptation is challenged by the complexity of the cross-sector and cross-scale nature of climate impacts and the systems and services which are vulnerable to them. Due to jurisdictional divisions and public-private divides in many climate-impacted systems, adaptation scholarship has increasingly turned to the study of governance to conceptualize and overcome challenges. To contribute to this field, this study engages in an in-depth characterization of the current governance of climate change adaptation in Canada. Using an established theoretical framework of competing governance modes, the study characterizes adaptation governance in two Canadian sites as well as identifies the preferred visions of governing processes according to expert practitioners. Through analysis of key documents, eighty-one in-depth interviews, and two expert workshops, the thesis provides a number of novel insights for Canadian and international scholarship. In the thesis it is argued that the study of adaptation governance benefits from the application of a typology of competing governance modes. Further, the study identifies that current adaptation efforts in the Canadian sites are dominated by network processes and that the concept of network failure is consistent with the observed adaptation implementation deficit. Finally, it is revealed that practitioners at different scales of government in Canada's federal structure idealize the governance of adaptation in drastically different ways, with local respondents providing critiques of network processes and increased interest in hierarchical governance. As climate impacts are projected to worsen in the coming decades, the findings of the study offer crucial insights for intervention into the governance of climate change adaptation.

Keywords

Adaptation, Canada. Climate Change, Governance, Policy,

Co-Authorship Statement

Danny Bednar is the lead and sole author of Chapters 1 and 5. Both chapters received editorial and conceptual comments from advisors Dr. Gordon McBean, Dr. Dan Shrubsole, and Dr. Dan Henstra. Chapters 2, 3, and 4 were written as individual manuscripts with the purpose of publishing in academic journals. Because of this, they use plural language to represent the authors, and, at time, re-establish concepts already covered in Chapter 1.

Danny Bednar is the lead author of Chapter 2, Applying a Typology of Governance Modes for Climate Change Adaptation. The article was co-written with Dr. Dan Henstra and has been accepted for publication in the journal *Politics and Governance*.

Danny Bednar is the lead author of Chapter 3, Is Network Failure to Blame for the Implementation Deficit? The chapter received editorial and conceptual feedback from Dr. Gordon McBean, Dr. Dan Shrubsole, and Dr. Dan Henstra. A manuscript co-written by Bednar, Hesntra, and McBean, based on the chapter, is in revisions in the journal *Environmental Policy and Planning*.

Danny Bednar is the lead author of Chapter 4, Climate Change Adaptation and Alignment of Governance Visions. The chapter received editorial and conceptual feedback from Dr. Gordon McBean, Dr. Dan Shrubsole, and Dr. Dan Henstra. A manuscript co-written by Bednar, McBean, and Henstra will be submitted for review in January 2019.

Danny Bednar is the lead author of a publicly available policy report also based on the research, *The Governance of Climate Change Adaptation in Canada*. The report was published in January 2018 by the Institute for Catastrophic Loss Reduction and was co-written by Jonathon Raikes and Dr. Gordon McBean.

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Chapter 1

1 Introduction to the Study

This study examines the multi-scale governance of climate change adaptation in Canada with a specific focus on the provinces of Manitoba and Ontario. Despite nearly three decades of research and practice regarding the impacts of climate change, how to govern our response remains a complex question for public policy (Huitema et al., 2016; Henstra, 2017). There is no clear answer for how cities, regions, and countries ought to best prepare as uncertainty around the scope, and pace, of climate change gives the problem a unique face in each locale and sector. Further complicating adaptation are the cross-sector, cross-scale nature of climate impacts. To contribute to the solution of this challenge, this study seeks to add conceptual and empirical clarity to these issues.

Using Canadian examples, the study employs an analytical framework grounded in the governance literature to examine the ways in which climate change adaptation is currently governed, as well as the views of expert practitioners about how adaptation *ought* to be governed. The application of the framework is explored in Chapter 2, and empirical findings presented in Chapters 3 and 4. While no single governance strategy can be identified for all cases, as will be shown, the lack of engagement with competing governance theories so far within the adaptation literature, as well as the novel insights discovered in the empirical data, reveal the value and timeliness of the project.

The following sections describe relevant background literature on climate change adaptation and governance and then elaborate on the project's research design and methods. Table 1.1 presents the conceptual outline of the project, indicating how the background literature led to the identification of a research gap which is addressed through the development and operationalization of the project's design and research methodology. The remainder of this chapter provides necessary background for the reader to engage the theoretical and empirical discussions of further chapters and assess their value to the wider academic community. The chapter concludes by briefly outlining the remaining thesis.

Table 1.1 Outline of the thesis

Background Literatures	• Climate Change Adaptation • Public Governance • Adaptation Governance
Literature Gap	• Adaptation governance literature has yet to fully engage broader theoretical frameworks of governance. • Adaptation governance remains in need of robust characterization of current modes of governance with multi-scale and theoretically informed primary empirical analysis. • While adaptation governance research has implied that 'governance barriers' emerge via the misalignment of approaches between local and higher-order governments. Governance preferences between these scales have not been compared.
Theoretical Frameworks	• Five stages of climate change adaptation • Four modes of governance • 'Governance issues' as barrier to adaptation (misalignment)
Research Questions	• RQ 1 – Can an established theoretical framework of governance types offer clarity in conceptualizing different approaches to governing adaptation? • RQ 2 – Based on a robust set of insights from practitioners at multiple scales, what are the current dominant modes of adaptation governance in Canadian sites? • RQ 3 - What preferences exist amongst adaptation practitioners regarding governance arrangements and do visions differ by order of government?
Research Methods	• RQ 1 - Document review (N = 91) • RQ 2 - Document review (N = 91), In-depth Interviews (N = 81) • RQ 3 – In-depth Interviews (N = 81), Workshops (N = 2)
General Findings	• RQ 1 - Adaptation governance can be better conceptually constrained through the application of an established four-mode theoretical governance framework as applied to existing adaptation programs • RQ 2 - Network governance is dominant in selected Canadian approaches to climate change adaptation. Further, the 'adaptation implementation deficit' is consistent with known limitations of the network mode. • RQ 3 – Practitioners' governance preferences do differ by order of government, with local respondents showing significant preference for hierarchy and some dissatisfaction with network governance; accordingly higher orders prefer networks and are generally uninterested in hierarchy.

1.1 Literature Review: The Evolution of Climate Change Adaptation

1.1.1 Climate Change Adaptation: Definitions and Concepts

This section will outline the evolution of climate change adaptation research from its early conception to its most recent trends. Along the way, two diversions are taken from the timeline to clarify and define both ‘adaptation’ and ‘governance’. It is the goal of this section to provide the reader with the necessary background on the sub-genre of adaptation governance to which this thesis contributes.

While specifics of climate change adaptation are still contested, the general concept can be said to be well-defined. The reason for this is that adaptation is immersed within the wider global research community committed to addressing climate change. As part of this research community, the World Meteorological Organization’s (WMO) and United Nations Environment Program’s (UNEP) Intergovernmental Panel on Climate Change (IPCC) produces global literature reviews of climate change research roughly every five years. These reports have the effect of generating relative consensus around certain key terms, one of those being adaptation. Per Working Group II in the most recent IPCC assessment report (Assessment Report 5, henceforth AR5), climate change adaptation is defined as:

> *“the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects”* (Noble et al., 2014, 838).

To elaborate on the above definition, we can also look to AR5 contributing authors Noble et al. (2014, 839) who provided a complementary description that further revealed the complexity of the issue:

> *Adaptation involves reducing risk and vulnerability; seeking opportunities; and building the capacity of nations, region, cities, the private sector, communities,*

> *individuals and natural systems to cope with climate impacts as well as mobilizing that capacity by implementing decisions and actions.*

As this second definition shows, the fact that climate impacts span across multiple sectors and levels of society makes adaptation inherently complex. These descriptions of adaptation, and the understanding of its complexity, have evolved over time from a plethora of empirical and theoretical work over the past three decades. To more fully grasp adaptation and its related key concepts, it is worthwhile to briefly review the emergence of the field in the late 20th century.

Smit et al. (1999) made a pioneering contribution in the evolution of adaptation by providing a conceptual framework of adaptation as a process and clarifying its key terms and objects of study (Figure 1). Working to synthesize formative adaptation research from Burton (1996) and Tol et al. (1998), among others, the authors identified that adaptation as processes is best understood as both an assessment of climate impacts and as a response to climate-related threats. Smit et al.'s (1999) distinctions are useful here because they have influenced the way in which adaptation has been conceptualized since, as well as how it is conceptualized throughout this study (as a cycle of stages). While it is possible to look at Smit et al.'s (1999) two major categories, of assessment and response, as sequential stages of adaptation (Figure 1), the authors are clear that they can also take place concurrently and are not therefore always separate from one another (Smit et al., 1999).

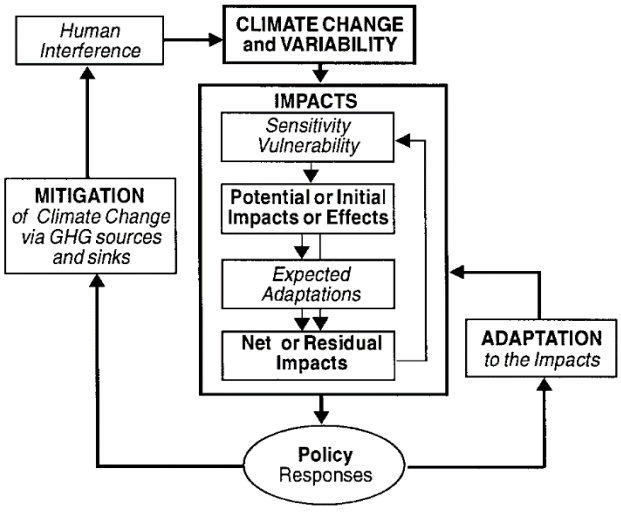

Figure 1 - Smit et al.'s (1999) conceptualization of adaptation processes

Along with elaborating on adaptation as process, Smit et al. (1999) also stressed the need for consistency in terminology and empirical focus within the burgeoning field. To do so the authors highlighted three key questions to help guide adaptation scholars: (1) 'adaptation to what?'; (2) 'who or what adapts?'; and (3) 'how does adaptation occur?' (Figure 2). Addressing 'adaptation to what?' requires that adaptation analysis clearly articulates the phenomena to which adaptations are, can, or should be made with reference to specific climate characteristics (Smit et al. 1999). These climate characteristics can include long-term changes in climate, decades or medium-range changes, or extreme climate events. Regarding 'who or what adapts?' Smit et al. (1999, 207) pointed out that *"any systematic treatment of adaptation requires definition of the system of interest and of the participants in the adaptation process".* The final core question of adaptation is 'how does adaptation occur?' For the authors, the answer to this question is provided through analysis of adaptation as an ongoing process as well as through description of adaptation processes that have occurred (interventions, programs, policies) (Smit et al., 1999).

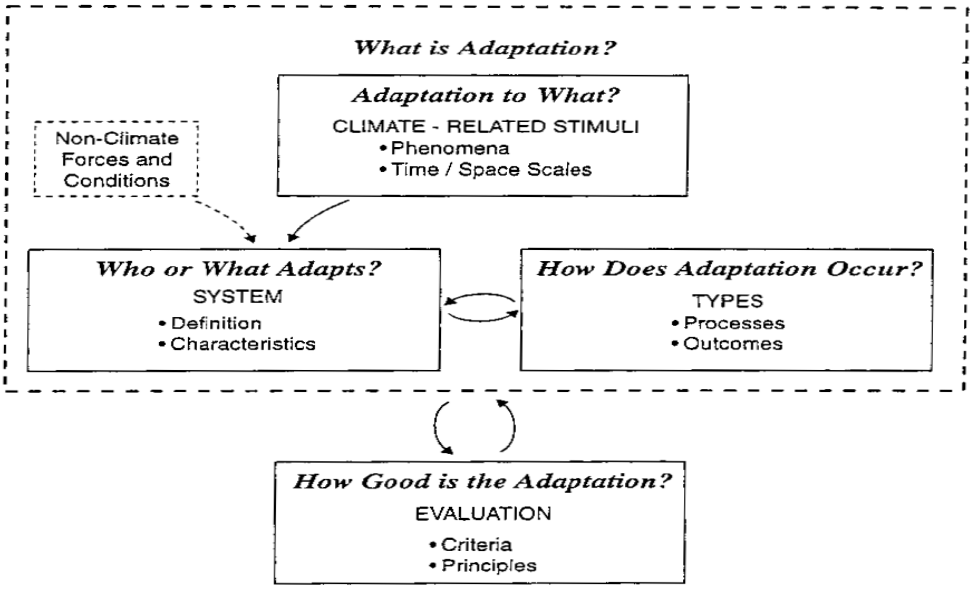

Figure 2 - Smit et al. (1999)'s three fundamental questions for climate change adaptation

In reviewing the literature that has emerged since Smit et al. (1999), the questions for analysis posed by the authors have all received varying degrees of attention. Section 1.1.3 will review relevant portions of this adaptation research from the past few decades. However, before the further evolution of adaptation research is discussed, Section 1.1.2 clarifies how this study conceptualizes adaptation by describing it as a series of identifiable stages that may be applied to different impacts or sectors, building off the outline presented by Smit et al. (1999).

1.1.2 Conceptualizing Adaptation as a Cycle

Because adaptation can be undertaken by individuals, governments, and private firms, and with the intent of adapting natural or social systems to a variety of different hazards, the process itself is incredibly varied in both research and practice (Burton, 2006). In scholarly literature, there are myriad lenses through which adaptation is viewed, including sectoral approaches, place-based reviews, and impact-, or hazard-specific analysis. This multitude of lenses leads to the object of study varying drastically across the adaptation literature.

This veritable potpourri is further complicated by research which often reviews adaptation through non-distinct phenomena that are not always explicit policy programs or instruments, but tenuously connected operations taking place over long time periods or large spatial areas (Dupuis & Biesbroek, 2013; Vogel & Henstra, 2015). What is generally accepted however is that, as phenomena, adaptation is a process (Massey & Huitema, 2013).

In approaching adaptation for study then, it can be difficult to understand where to start and what exact process is the object of study. Indeed, it is sometimes unclear whether adaptation is itself an established field of study or a subset of other research topics; some have questioned whether adaptation is a defined process or, rather, a sub-process built into others (Massey & Huitema, 2013). Further, many studies avoid clearly outlining how they are conceptualizing adaptation (e.g., place-based, sectoral, individual) or what part of adaptation is their focus (e.g., assessment, deliberation, implementation). Therefore, to avoid contributing to the often-amorphous nature of adaptation research, this study makes explicit its conceptualization of adaptation as an object of study, as called for by Smit et al. (1999). This project approaches adaptation holistically as a processes and cycle of stages aimed at preparing a person, government, firm, system, sector, or place for the impacts of climate change. Building upon the conceptual stages highlighted in Smit et al. (1999) and developed further by the IPCC (Mimura et al., 2014; Noble et al. 2014) and the International Council for Local Environmental Initiatives (ICLEI, 2013), this study uses a five-stage cycle to simplify adaptation as a more constrained process for interrogation, but one with discrete components which can be further resolved when necessary (Figure 3).

The stages presented here are not expected to encapsulate all possible dimensions of climate change adaptation, but the complexity of the field requires boundaries to facilitate meaningful analysis. Similar stage-, or cycle-based, conceptualizations of adaptation have also been espoused by government and non-governmental organizations working to assess or communicate the topic while keeping complexity and confusion to a minimum (ICLEI, 2013; Auditor General of Canada, 2017). Further, this thesis is primarily focused on the

governance of adaptation rather than the specific sub-processes of adaptation, so while certain stages are discussed more than others (primarily implementation in Chapters 3 and 4) the primary focus is on the governance of the entire process. Ultimately the purpose of outlining an adaptation cycle is to provide a consistent point of reference in regard to use of the term adaptation throughout the thesis.

The first stage of adaptation is recognizing climate change and its expected hazards. The main goal of this stage is to identify relevant ongoing, and projected, climate change and its hazards over a given spatial area. Specific hazards may be long-term or short-term, such as: altered seasonal temperatures, new precipitation averages, sea level rise, and events (intense rainstorms, heat waves, and drought). Such a stage then takes into consideration both changes in climate averages and climate-related extreme events in any one area.

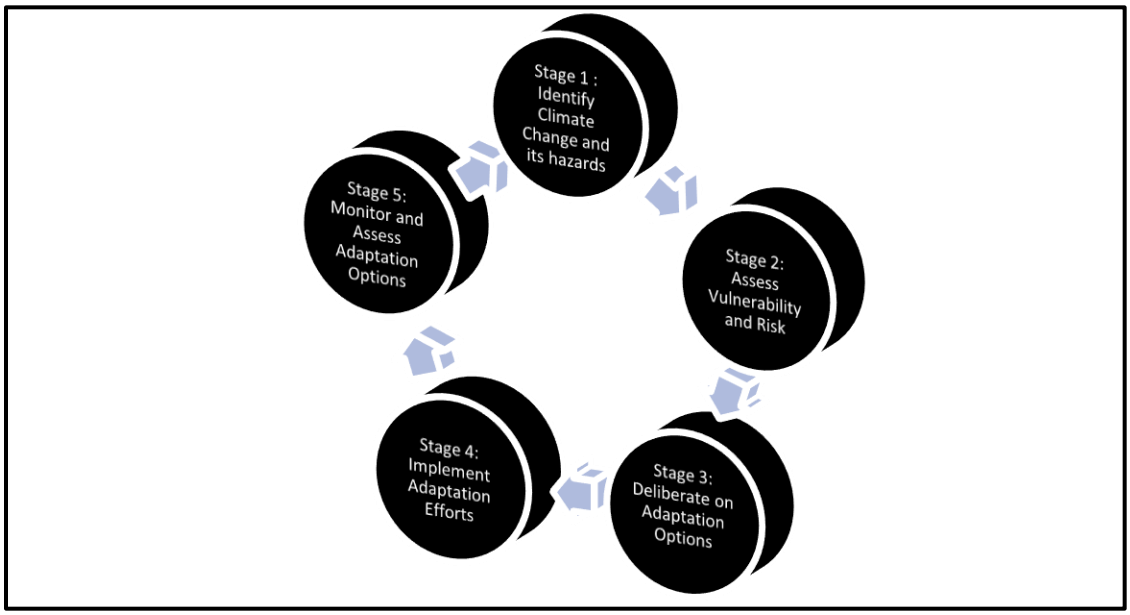

Figure 3 - The adaptation cycle as conceptualized for this project

The second stage of adaptation is characterized by assessments of vulnerability and exposure to, and risk from, the identified climate hazards. In this stage, the expected impacts of climate change on systems within a region, jurisdiction, service, or sector (or to an individual) are assessed. Each actor in a society, from a national government to the

individual citizen, interacts with systems to be impacted by climate change and various jurisdictions around the world have undertaken sector-specific or regional impact assessments and vulnerability assessments of some form (Berrang-Ford et al., 2011). For example, in the Canadian context, a health sector-specific approach to vulnerability assessment has been conducted at the national level by Health Canada (Seguin, 2008), and at local levels by the City of Toronto (Gower et al, 2008), to identify how Canadians' health and health care systems may be vulnerable to climate impacts. Additionally, national assessments of climate hazards, risks and vulnerabilities by region and sector have been conducted in Canada (Lemmen et al., 2008; Warren & Lemmen, 2014). For a private firm, risk assessment may include exploring impacts on supply chains, labour conditions, or consumer demand. Individual citizens can also identify their own vulnerability, exposure and risk, such as to their health and property (Thompkins & Eakin, 2012).

The third stage of climate change adaptation is the deliberation of options regarding specific adaptation measures and any accompanying implementation instruments. A single impact or vulnerability can be addressed in a multitude of ways. For example, the hazard of sea level rise can be addressed through different adaptive measures such as sea walls or, alternatively, updated land-use planning. In addition, these different adaptive measures can be implemented with different kinds of supporting instrument. In policy circles, the diverse means of implementing adaptive measures are understood as 'policy instrument' choices and broadly categorizes as belonging to three groups: regulatory, market, and persuasive (Henstra, 2016).

To further clarify the distinction between an adaptive measure and a policy instrument an example is helpful. A local government that recognizes an increased likelihood of extreme hot days (days above 30° Celsius) and significant risks related to heat waves, may identify that increasing the number of cooled homes would be a viable adaptive measure to reduce this risk. In this instance, the local government could take a regulatory approach and invoke bylaws (instrument) requiring landlords to provide means to keep rental units below a specified temperature in the summer months (adaptive action). However, regulation (via

bylaw) is only one type of policy instrument; a different approach could be invoked in which homeowners and tenants are provided subsidies for implementing cooling strategies (e.g. tree shading, energy efficient air conditioning, or window screens), thus reaching the same adaptive action of increasing cooled homes, but via a different policy instrument. The selection of adaptive measures and their accompanying policy instruments is a significant portion of adaptation governance addressed in this project and discussed in more depth below, as well as in Chapters 2, 3, and 4.

The fourth stage of climate change adaptation is the implementation of adaptive measures. For government, this entails operationalizing the policy instruments identified in the deliberation stage to support the adaptive action. Implementation is the stage of adaptation that is traditionally the 'sticking point' for many actors, including governments (Dupuis & Knoepfel, 2013). Mimura et al. (2014, 871) note that 'institutional dimensions' can provide a significant challenge to an actor moving from deliberation to implementation. As will be discussed below, these institutional dimensions, such as having requisite jurisdiction and necessary resources, are fundamentally questions of governance.

The fifth and final stage of climate change adaptation is monitoring and evaluation. Monitoring implies that the implemented measures are reviewed for their success in creating resilience to climate change impacts or reducing vulnerability to climate risks (depending on the lens). As of 2019, few jurisdictions are at this stage in any systematic sense and globally there are limited examples of concrete adaptation programs evaluated for their success in either fostering resiliency or reducing vulnerability (terms themselves that are difficult to quantify) (Dupuis & Knoepfel, 2013). Assessment will necessitate further deliberative processes of identifying successful components of the adaptation initiative, as well as any needed adjustments. Fundamentally assessment requires identification of adaptation indictors, yet robust, agreed upon, indicators have proved rather elusive to the adaptation research community (United Nations Environment Program, 2017). Overall, both latter stages of adaptation, implementation and assessment, have been

somewhat under-represented in adaptation literature and practice (Berrang-Ford et al., 2011; Mimura et al., 2014).

As with Smit et al.'s (1999) processes, the climate change adaptation cycle as presented here is both iterative (learning as you go) and cyclical (without a necessary end), as reviews of progress and new information on impacts may lead to new vulnerability assessments and deliberation (Figure 3). It should also be noted that each of the discrete stages are themselves considered sub-fields within climate change adaptation research. In the early years of adaptation research much of the focus was on hazard identification (stage 1) and risk assessment (stage 2) (Berrang-Ford, Ford, & Paterson, 2011). Fittingly the research on adaptation has somewhat followed the stages, with deliberation (stage 3) and implementation (stage 4) dominating much of the more recent adaptation literature, and monitoring and assessment (stage 5) currently emerging as a popular area of study. Having introduced the adaptation cycle, Section 1.1.3 now continues the examination of the evolution of adaptation research.

1.1.3 Climate Change Adaptation: From Capacity and Barriers to Implementation

Since the turn of the century, adaptation scholarship has evolved steadily. While early work from Tol et al. (1998), Smit et al. (1999), Adger (2001), and Burton et al. (2002), made clear that adaptation was both a physical and social challenge, much of the adaptation research that immediately followed focused on the technical and scientific challenges (e.g. stronger infrastructure, ecosystem intervention) of adaptation with less attention paid to social and political factors (Mimura et al., 2014). However, by the time of the IPCC's AR5 it was recognized that: *"the framing of adaptation has moved further from a focus on biophysical vulnerability to the wider social and economic drivers of vulnerability and peoples' ability to respond"* (Noble et al., 2014, 833).

This early focus on technical and physical systems can be said to have reflected an instrumentalist bias in early adaptation research (Wellstead et al., 2013; Wellstead & Howlett, 2017). The assumption was that once adaptation challenges were recognized —

identifying hazards, measuring vulnerability, and developing necessary technology to adapt— then implementation would necessarily follow from the development of technological and procedural fixes. In much early research, such adaptive capacity was thought to be the desired state, with implementation necessarily following. As an aside, adaptive capacity is a key term in adaptation literature and is currently defined as *"the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences"* (Agard et al., 2014, 1757). As it turned out, early conceptions of adaptive capacity were over-zealous in their assumptions of progress as it did not guarantee implementation, and empirical research thoroughly indicated that adaptation progress was more nuanced and intertwined with a multitude of factors beyond knowledge and technology alone (Mimura et al., 2014). Nonetheless, adaptive capacity itself remains a significant concept of study within the field, as it has evolved over time (i.e., capacity did not necessitate action).

Through the analysis of adaptive capacity and its components, the adaptation literature also began to explore 'adaptation needs' (Burton, 2006). Adaptation needs are the difference between perceptions of what will be required in order to be 'adapted' (or have adaptive capacity), and broadly, the current state of adaptation in the face of expected impacts of climate change (Noble et al., 2014). As these needs were consistently identified to be missing in application, researchers identified that there were barriers in attaining adaptation needs (or implementing adaptation). This led to much work identifying and categorizing 'adaptation barriers'. However, early barriers research had to work to overcome the still lingering instrumentalist assumptions within some of the adaptation community. Indeed, initial work in this movement framed entire pieces around whether social and political barriers even existed, something very much taken for granted in current literature (Adger et al. 2008; O'Brien, 2009). The literature on adaptation barriers grew exponentially near the end of the first decade of the 21st century, expanding via increased empirical insight into early adaptation initiatives via case studies. With this shift in attention toward barriers, researchers began to more strongly assert that adaptation was a value-laden process reliant

on key actors and institutions, arguing that adaptive capacity was secondary to adaptive will and values (O'Brien, 2009).

A central piece in the barriers literature was Adger et al. (2009, 338-9) which presented four theses for understanding the social drivers of what the authors called, at the time, 'adaptation constraints':

> *(1) Limits to adaptation depend on the ultimate goals of adaptation, which are themselves dependent upon diverse values; (2) Adaptation need not be limited by uncertainties associated with foresight of future climate change; (3) Social and individual factors limit adaptation action; and (4) Systematic undervaluation of involuntary loss of places and culture disguises real, experienced but subjective limits to adaption.*

In the following years, analysis of these social barriers, comprised a significant portion of research on climate change adaptation (Burch, 2010a; Burch 2010b; Amundsen et al. 2010; Measham et al., 2011; Carlsson-Kanyama et al., 2011). Researchers typically used case studies to identify barriers and worked to ascertain their sources and solutions, with barriers often being categorized into groups such as: technical, knowledge-based, jurisdictional, and political (Burch, 2010a). Later contributions also emerged that critiqued the barriers concept, arguing that research in the vein was often too superficial to provide meaningful solutions (Biesbroek et al., 2013; Wellstead et al. 2017). As a result, the barriers research became more intricate and detailed in its exploration. Section 1.1.6 will return to this issue in order to explain how the barriers literature led to adaptation's governance turn.

One final trend in adaptation research that relates to this project is the recent focus on implementation, or more accurately, the lack thereof. As discussed, when viewing adaptation as a process, implementation and assessment make up the later stages of the cycle and these stages have received less attention in the empirical adaptation literature. One reason is the lack of adaptation programs or policies at such stages which can could be analyzed (though this is rapidly changing) (Dupuis & Biesbroek, 2013; Dupuis &

Knoepful, 2013). Nonetheless, over the past five years the question of implementation has emerged as key subject in the adaptation literature, a component of this has also been discussion of an implementation deficit.

The term ‘implementation deficit’ refers to the (relative) lack of implemented adaptation programs or policies despite the abundance of research into the topic over the past three decades, and the many jurisdictions already undertaking stages 1 through 3 (Berrang-Ford, Ford, & Paterson, 2011; Dupuis & Knoepful, 2013). The implementation deficit concept builds off of an earlier notion of a wholesale ‘adaptation deficit’ discussed by Burton (2006). The more recent implementation deficit was discussed explicitly in AR5 by Mimura et al. (2014, 876) who outlined that:

> *There is still limited evidence of adaptation implementation. Implementation remains challenging because in the transition from planning to implementation the many interested parties must overcome resource, institutional, and capacity barriers.*

In the Canadian context, recent national assessments of adaptation progress also point to a distinct implementation deficit. A recent report from the Auditor General of Canada (2017, 29), concluded that:

> *The absence of clear direction and an action plan to implement the Federal Adaptation Policy Framework contributed to the lack of action to formally assess and respond to climate change risks in most of the departments and agencies we examined, leaving the government largely unaware of its climate change vulnerabilities*.

At the federal scale, the Government of Canada has yet to be beyond much of the first two stages of the adaptation cycle. In the provincial case, the findings of a collaborative report from the provincial Auditors General of Canada similarly found that only eight out of twelve reviewed provinces and territories had released general adaptation strategies (Alberta, Manitoba, Northwest Territories, and Saskatchewan having no strategies), and

none were at a stage of large-scale implementation. The collaborative report of the provincial auditor generals (Auditor General of Canada, 2018, 16) concluded:

> *"many of the* [provincial] *adaptation strategies outlined high-level commitments, but few had an implementation plan that spelled out the more manageable interim steps needed to reach these commitments.*

While the early stages of adaptation remain a significant focus of research, recent attention to implementation and monitoring suggests that by the time of the sixth IPCC assessment report in 2021, significant advances will have been made in implementation and measurement research globally. For example, in the Canadian context, a national report on monitoring and assessment strategies was released towards the end of this study (Environment and Climate Change Canada, 2018).

In summary, while other sub-fields of adaptation have emerged that are not discussed here (such as framing, ecosystem services literature, and finance), this description of how adaptation research went from a broad focus on capacity, to barriers, and more recently to implementation is meant not as a comprehensive account of the field but as a general introduction, and description, of the lineage of research that led to this project's conceptual development. The evolution plotted here, and how the barriers literature led to adaptation's governance turn, will be returned to in Section 1.1.6 However, before addressing adaptation governance, it is necessary to again deviate from the evolution of adaptation scholarship to introduce the larger concept of 'governance' and how it is used in this project.

1.1.4 Defining Governance

Governance, as a field of study, is well-established in western scholarship, and in its most basic form is the core of political philosophy and social science scholarship. The term governance is an extension of the verb 'to govern', which means to steer or control a population. To study governance is to study the features of social coordination around a particular issue in a defined geographic area (Bevir, 2009). From a critical perspective, the

study of governance also involves a normative assessment of the appropriateness and effectiveness of governance features for a particular social concern (Rhodes, 2012).

Authors often point to dual-usages of the term governance. In a conventual sense, governing was carried out by the formal authority of a system or space (Pierre, 2000). Matriarchs or patriarchs governed families, church officials governed parishes, kings governed kingdoms, and eventually democratic governments governed electorates. In such a scenario, governance was mostly a synonym for government. However, more modern usage of the term 'governance' has focused on conceptualizing the relations between state structures and actors with those outside of government (Pierre 2000; Thompson, 2003). As society became more complex, and actors wielding various governing capacities emerged to partner and rival the state, the term governance began to take on the definition of how an issue or population is governed via this *interaction* of both state and non-state actors. In approaching governance this study adopts Kooiman's (2003, 4) definition in his landmark work on the subject, defining governing and governance as:

> *Governance can be considered as the totality of interactions, in which public as well as private actors participate, aimed at solving societal problems or creating social opportunities; attending to the institutions as context for these governing interactions; and establishing a normative foundation for all those activities. Governance can be seen as the totality of theoretical conceptions on governing.*

In short, governance is how a society deals with an issue through various interactions, and these interactions can take multiple forms. It should be noted that governance then is both "something occurring" in society, as well as a field, lens, or framework, of study (Pierre & Peters, 2000, 24). In both occurrence and study, it is important to conceptually distinguish between governance as structure and governance as process, even if they are often analyzed concurrently (Pierre & Peters, 2000). Governance as structure refers to the analysis of the structural *forms* of coordination and relations taken in governing an issue amongst a population in a given territory (i.e. government and private institutional structures).

Governance as process, refers more directly to the *means* of steering or coordinating society around an issue (or within a territory) though policies and policy instruments. To distinguish different forms of these structures and their processes, the roles of various actors, the relationships among actors, and the means of steering (policy instruments) are the key distinguishing metrics of different 'governing modes' (Frances et al. 1991; Pierre & Peters 2000).

Returning to Kooiman's (2003) definition, evidently, it would be impossible to address the "totality of interactions" around any issue. Thus, this project takes key indicators of competing governance modes (actor roles and relations, policy instruments) as objects of analysis. This project addresses both governance structure and process through a framework of four distinct governance modes developed within governance research over the past half century. In distinguishing between modes of governance, the project draws two significant claims from the literature. The first is that, in any mode, the state is the central nexus of governance analysis due to its unique authority to legitimately wield coercive power (Pierre & Peters, 2000). Different modes of governance (structures and their processes) are therefore best identified largely through the place and role of the state, as well as what doth the state in its relations with other actors (even if that includes a lack of relations).

As Pierre and Peters (2000, 12) put it, the role of the state is the most identifiable and viable means on which to compare governance approaches, despite changing relationships between state and non-state actors:

> *We believe that although governance relates to changing relationships between state and society and a growing reliance on less coercive policy instruments, the state is still the centre of considerable political power. Furthermore, emerging forms of governance depart from a model of democratic government where the state was the undisputed locus of power and control, hence we cannot think of any better 'benchmark' than the image of the state as it is portrayed in liberal-democratic theory.*

The second point is that each governance mode carries with it an internal logic of appropriate state roles, actor relations and policy instruments (governance features), that are internally consistent, philosophically distinct, and empirically observable (Meuleman 2008; Hall 2011). The following section briefly outlines the framework, which is expanded upon in Chapter 2 via its application to climate change adaptation. However, because governance is a broadly used term with multiple meanings and sub-genres, a point of clarification of terminology is necessary.

The term 'multilevel governance' (MLG) has caused some confusion in the literature, especially as governance is applied to various issues (such as adaptation). The confusion mostly emerges around whether governance analysis that observes processes and structures at multiple scales is a distinct form of governance research called 'multilevel governance'. Use of the term multilevel governance as a field of study varies. When governance analysis has an explicit focus on the interaction between levels of government it has often been identified as research on 'multilevel governance'. However, this approach could also be called 'intergovernmental affairs', since governance typically, though not necessarily, includes discussion of non-state relations as well.

Nonetheless, multilevel governance has been invoked in a state-only sense in the adaptation literature quite often, notably in Europe (Unwin & Jordan 2008; Amundsen et al. 2010; Nilsson et al. 2012; Juhola 2015). Yet, more conventionally, MLG is defined as including both multiple levels of government (hence multilevel) and non-state actors (hence governance) (Young, 2012). Though, in this sense, the term 'multilevel' could be periphrastic, as the bulk of governance theories, outlined by Kooiman (1993, 2003), Rhodes (1997), Pierre & Peters (2000), Thompson (2003), Meuleman (2008), Bevir (2009) and Levi-Faur (2012) addresses both state and non-state actors across any relevant scales, as does the four-mode typology which emerged from this literature. Additionally, it is unclear if MLG analysis must include state and non-state actors or which scales of governance are addressed, as the literature varies on this (Bevir, 2009). In many cases, non-governance scholarship, in it's application of governance terms, has taken them quite

literally, implying that any discussion of governance that's spans two or more scales is 'multilevel governance'.

Finally, this study is only engaging governance at scales of the national and lower, as has much other research in Canada; see, for example, entries in Horak & Young (2012) and Henstra (2013) and climate change adaptation (see, for example entries in the journal *Ecology & Society* special issue edited by Huitema et al, 2016). Nonetheless, it is recognized that MLG has its roots in more international relations-related literature developed largely around analysis of the European Union by scholars such as Hooghe & Marks (2003), Bache & Flinders (2004), Jessop (2004), and Piattoni (2010). Because of MLG's international genealogy, and disputed meaning, this thesis uses only the term "governance" as an encapsulation of four potential means of relations for society to address an issue (below) in the vein of Jan Kooiman, R.A. Rhodes, Jon Pierre and others noted above. That being said, because the two literatures share many common concerns, some key insights from the MLG literature are discussed.

1.1.5 A Typology of Governance Modes

From a research perspective, approaching governance as the "totally of relations" (Kooiman, 2003) is not a plausible research agenda; to carry out a doctoral project a more parsimonious approach is necessary. Therefore, to analyze climate change adaptation governance, this study employed an analytical governance framework of four distinct modes of governance (Table 1.2). As discussed, these distinct modes of governance rely on internal logic of structures, such as state roles, the institutionalized relations among actors, as well as processes of actor relations and policy instrument use (Pierre & Petters, 2000; Thompson, 2003; Hall 2011; Bevir 2012). These components provide identifiable features which can be observed to understand current and potential governance.

While other analytical governance frameworks exist, (see, for example, Trieb et al., 2007; Lange et al., 2013), the framework was chosen because of its robustness and because it has been found to be theoretically sound, conceptually clear, and empirically tested to

account for most observed processes of governance (Frances et al., 1991; Pierre & Peters, 2000; Thompson, 2003; Tenbensel, 2005; Meuleman, 2008; Hall, 2011; Bevir, 2012; Pabloist 2015; Pahl-Wostl, 2015). Additionally, the application of the framework also helps to address the de-politicised nature of much adaptation research (Wellstead et al., 2013; Eriksen et al., 2015) by providing conceptual alternatives as to how adaptation is, can, or should be governed.

Table 1.2 - A typology of governance and key features

	Hierarchy	**Market**	**Network**	**Community**
Actor Relations	Top-down	Circular (supply and demand)	Horizontal	Bottom-up
Actors with Dominant Roles	Federal, regional and local governments	Government and market actors	Government, private sector, and non-governmental experts	Citizens, community groups, neighbourhood associations
Dominant Policy Instruments	Legislation and regulation	Supply and demand; government market intervention	Negotiated agreements, codes of practice, voluntary programs	Self-regulation, voluntary participation

The application of the framework is further bolstered by other insights, including Jessop (2004) who argued that governance scholarship can be overly state-centric or network-focused, relying too heavily on one of these two conceptual frameworks, and should instead be focused on the meta-governance of governance structures (the governance of governance modes) mostly by the state or state-like entities (Jessop disagrees that 'the state' can be so easily defined and distinguished). While this is taken into consideration through a focus on the state's remaining role even in modes other than hierarchy, it is thought that much of Jessop's work on meta-governance is largely academic and theoretical, or too macro-scale (European Union and international politics) to be applied here as it does not aim to describe or critique local scales and offers few observable features for an analyst to work with.

Another consideration in applying the typology is that of Rhodes (2012) who argued that governance research needs to move beyond pedantically addressing structures (actors institutions) or processes (relations, steering instruments, meta-governance) and include interpretative analysis of governance's meaning (values and politics). Chapters 2, 3 and 4 all engage this further through discussion of the normative component of governance inherent in any mode's support or operationalization. In short, it is contended that the employment, or preference, for certain governance features are value laden visions for how an issue, such as climate change adaptation, ought to be addressed (Hall, 2011).

The application of this framework is meant to avoid many of the pitfalls of some modern empirical governance literature which overlooks alternative modes of governance in favour of a description of present features only in the context of an assumed network, or polyarchy, dominance (Peters & Pierre, 2004; Rhodes, 2012). As is discussed throughout the thesis, the network-focus was also recognized as a limitation of existing adaptation research where network governance is often taken as the *de facto*, unchangeable, mode of governance and in which discussion of alternatives are avoided, such as in: Amundsen et al. (2010), Carlsson-Kanyama et al. (2013), and Baird et al. (2014). The reason for this may be the increasing popularity (especially in the sub-field of environmental governance) of collaborative and network governance arrangements over the past thirty years (Borza, 2011). Because of this normative bombardment and literary omnipresence, some governance scholars have argued that the prevalence of network governance has led to a sort of 'concept capture' for the term 'governance' as a whole. As Tenbensel (2005, 285) puts it:

> *There is some confusion as to whether all modes of interaction and exchange should be considered as different types of networks or whether networks are just one type of coordination*

When it comes to the question of whether all governance is networked or networks are simply one form which governance can take, this project concurs with Thompson (2003, 2) on this issue, that:

> *Networks have become a ubiquitous metaphor to describe too many aspects of contemporary life. And in so doing, the category has lost much of its analytical precision. It has become a term with many uses but one that has lost any clear conceptual underpinnings – it has become a 'word' rather than a 'concept'. As has been argued many times before, something that claims to explain everything ends up by explaining nothing, and this is a clear danger in the case of networks.*

In short, for networks (and governance) to mean anything, there must be observable and comparable demarcating features. In this case, the selected features for distinction are actor roles, actor relations, and policy instruments which can be shown to differ between networks and other modes. While all governance (or any social system) may include literal networks of relations, whether processes within them are governed by the logic of network governance is distinguishable from other governance logics (indicating that perhaps a distinction between 'networks' and 'Network Governance' is needed in the governance literature).

The preceding two sub-sections (1.1.4 and 1.1.5) have aimed to introduced governance and the four-mode framework applied in this study. The sections have also worked to clarify common points of confusion stemming from the diverse use of the word governance and its many sub-fields. The following section returns to the evolution of climate change adaptation research.

1.1.6 Climate Change Adaptation: From Adaptation Barriers to 'Governance Issues'

Returning to the discussion of the evolution of adaptation research left off in Section 1.1.3, one of the emerging themes of the 'adaptation barriers' literature was the recognition of barriers related to *"complex inter-relations between stakeholders and societal coordination* [that] *can be included under the term governance"* (Frohlich & Knieling, 2013, 9). As this section explains, a variety of barriers to advancing progress on climate change adaptation began being identified as 'governance barriers' in the empirical case study literature. This group of barriers emerged largely as a result of the complexity of

adaptation and its applicability to a multitude of intertwined social scales (personal, local, regional, national), as well as the cross-jurisdictional and cross-sectoral nature of climate hazards, vulnerability, and risk (Noble et al., 2014). The remainder of this sub-section outlines some of the key studies in this barriers literature which has focused largely on intergovernmental relations (as a precursor to adaptation's full governance turn addressed in the following section).

Burch's work with local managers in British Columbia, Canada (2010a, 2010b) explored barriers to adaptive capacity amongst planners in three municipalities and identified three major barrier types: cultural, structural, and behavioural. Burch (2010b) argued that overcoming these barriers to adaptation was not necessarily about creating further adaptive capacity, but instead addressing what she called jurisdictional issues. Burch (2010b) proposed governance strategies for overcoming these barriers via new actor roles and relations such as: higher standards imposed by provincial governments; recognition of local planning interests by provinces; a federal role in removing market barriers to green technology; and increased funding for adaptation from provincial governments.

Similarly, Henstra, (2012) found that local adaptation efforts were limited by governance issues related to local funding as well as jurisdictional authority in both Toronto and Halifax. Picketts et al. (2012) also found that local level knowledge was essential for adaptation but relied on processes at higher orders of government as implementation of local knowledge was limited by discord between federal, provincial, and local interests. As the authors concluded: *"actions in BC and in Canada should be normalized into existing plans and build upon and link with regional, provincial, and national initiatives"* (Picketts et al., 2012, 134). All three (Canadian) studies (Burch, 2010; Henstra, 2012; and Picketts et al., 2012) concluded with a call for increased attention to governance arrangements to overcome adaptation barriers.

In the international context, Amundsen et al. (2010) conducted surveys with Norwegian municipalities and found that as the central actors of adaptation, municipalities were constrained by a lack of local expertise on adaptation issues and an unclear role for local

institutions. The authors concluded that there was a strong desire from local authorities to have responsibilities clarified by national authorities. Similarly, amongst their conclusions, Measham et al. (2011) agreed with the suggestions of earlier studies pointing to a lack of direction from higher levels of government as a barrier to prioritizing adaptation within local governments. In their analysis of Australian municipalities, Measham et al. (2011) found that without the legal or political mandate to alter local planning efforts with consideration for climate change, adaptation interests were 'out-competed' by other local priorities such as urban development and transportation.

Like Amundsen et al. (2010) and Measham et al. (2011), Carlsson-Kanyama et al.'s (2013) analysis of local adaptation programs in Sweden identified 'that attention to issues of multilevel governance' were increasingly necessary in explaining adaptation barriers. Questioning whether smaller local governments will have the capacity to see their way all the way through the adaptation cycle, Carlsson-Kanyama et al. (2013) suggested that sub-national and national level governments need to recognize the challenges to adapting for local authorities and play some role in fostering progress. According to the authors, this would include synchronising efforts in order to reduce redundancies and maladaptation (adaptation efforts that do more harm than good).

While the above studies made the case that upper-level governments have the capacity to remove barriers at local levels, Urwin & Jordan (2008) found that neither a top-down nor bottom-up approach of policy analysis fully explained the barriers to adaptation in the United Kingdom. Urwin & Jordan (2008) note that "*negative policy interplay"*— when policies at other levels of government undermine adaptation initiatives— is a significant barrier to climate change adaptation via uncoordinated governance, but that solutions were not immediately evident one way or the other. In their study, the authors concluded that models of policy development which focused on either upwards or downwards influence across scales didn't prove better than the other in explaining adaptation progress in multilevel systems. In the Canadian context, Newman et al. (2013) also identified negative governance interplay, claiming that *"multilevel governance issues"* are a direct barrier to

effective adaptation in the Canadian transport sector, citing, as an example, the interests of some Canadian provincial governments to address both mitigation and adaptation in the transport sector via a mix of regulation and other instruments, but a conflicting federally imposed paradigm of de-regulation. Both Urwin & Jordan (2008) and Newman (2013) point to the potential that distinct visions of appropriate adaptation governance exist at different government levels, though neither explicitly engage in such a hypothesis beyond calling for coordination and attention to 'governance issues'.

When viewing adaptation at the national level, Juhola & Westerhoff (2011) identified that the different approaches by national level governments in Finland and Italy did not necessarily affect local activity on adaptation. Finland's national government developed a National Adaptation Strategy (NAS) which identified responsibilities for each sector at the federal level and provided directions to the regional government's environmental agencies, but no legal mandate was attached. Additionally, the Finnish NAS did not extend to the local governments nor addressed local responsibilities or measures (Juhola & Westerhoff, 2011, 242). As a result, some local governments in Finland were engaging in other adaptation networks not directly tied to the national strategy, from which they felt disconnected. In Italy, there was no formal national adaptation strategy in place and the national government focused more on adaptation research than programming. Despite not having a national strategy, as was the case in Finland, the authors found that local governments in Italy sought out European and international networks to help them facilitate adaptation action in the absence of national level engagement. While Juhola & Westerhoff (2011) noted the value of autonomous adaptation at the local level, they concluded that not creating formal mechanisms at the national level could be identified as a significant governance barrier to regionally coordinated adaptation.

In 2014, this state of adaptation governance as an emerging issue was summarized in the Fifth Assessment report of the Intergovernmental Panel on Climate Change, in which Mimura et al. (2014, 873) stated: *"As adaptation activities progress, many challenges have emerged…the roles of multi-level governance* [have] *become an issue, such as horizontal*

coordination among different agencies and departments and vertical coordination of various stakeholders from regional, national, to local actors". To summarize, the governance barriers literature emerged from the recognition that climate change adaptation was both complex and was neither solely a local phenomena nor national prerogative, but an issue of interaction among multiple scales. For the adaptation cycle to be addressed in its entirety, case studies, such as those reviewed above, have identified that the various capacities and assets of multiple actors would need to be recruited and coordinated. The result of recognizing governance as a barrier was an increased focus on the governance arrangements around adaptation and engagement with the broader governance literature.

The studies reviewed above are some of the key contributions from the adaptation literature that led to the conclusion that 'governance issues' required attention. Notably, many of these studies focused on relations between local and higher order governments. All of these studies concluded with calls for in-depth examination of adaptation governance that had yet to be empirically explored. As an example, Carlsson-Kanyama et al. (2013, 18), concluded that:

> *Further studies on barriers and limits to climate change adaptation at the local level would perhaps be more useful if powers and interest of stakeholders/decision makers at various levels in society were better explored than now.*

Indeed, many of the above discussed studies identified governance barriers through primary research (interviews, workshops) with local governments only, or through secondary analysis of documents. These limited methodological approaches are a driving reason that this project pursued the collection of multi-scale primary research data. Further, as the next section identifies, only recently has empirical adaptation literature turned to more holistic analysis of governance as processes including both state and non-state actors across multiple scales.

1.1.7 Adaptation's Governance Turn

In discussion of adaptation governance as a distinct sub-field that addresses how the complexity of adaptation is, will, or ought, to be governed, many will point to early work by Adger (2001) and Adger et al. (2005) for their discussion of cross-scale adaptation (or at least its theoretical challenges). Writing in the early days of adaptation literature, Adger (2001) outlined some of the distinguishing qualities between mitigation and adaption that researchers needed to recognize. Notably Adger (2001) identified that a majority of adaptation processes, and therefore research, was likely to take place at the local level, compared to the international scale of much mitigation research. This foresaw a common trend in adaptation in which 'adaptation is local' was a key maxim of the research community.

Adger et al. (2005) built off this previous work by pointing out that adaptation is more than a technical problem and that its socio-political components require considerable development in theory and observation. The key contribution was the recognition that actions at distinct scales of governance (local, regional, national) would require analysis for their effectiveness, efficiency, equity, and legitimacy in feeding the adaptation processes at local scales; ostensibly that adaptation was both multi-actor and more than local. Adger et al. (2005) made the case that adaptation could not be understood as the action of a single actor or scale of government, and that its advancement would require engagement of governance systems as a whole. Thus, despite adaptation 'being local', it was not separated from processes at other scales (or outside government). This was indeed formative to much later work on adaptation and governance, but like the insights of Smit et al. (1999), some of the foresights of Adger (2001) and Adger et al. (2005) were not fully embraced by the adaptation research community until the 2010s. Only recently has adaptation governance emerged as a distinct focus of study for scholars, and key studies from this emerging sub-field are reviewed for the remainder of this section.

One early contribution which applied governance insights to climate change adaptation was Otto-Banaszak et al., (2011) who interviewed 31 adaptation experts across Europe.

While the authors did not introduce a formal typology of governance arrangements, they invoked the use of 'mental models' as competing forms of potential adaptation governance (interactions of actors across scales and sectors). The authors found that different respondent groups (elected officials, public servants, industry, and environmentalist) held differing visions regarding how adaptation should be governed (actors and their relations). However, the authors' lack of a framework for governance arrangements or discussion of policy instruments, led to only broad conclusions about the need for collaborative processes in policy making. Further, the authors neither engaged the current state of adaptation in their case sites nor addressed the appropriateness of various mental models and the interpretation of why practitioners may prefer some over others. While Otto-Banaszak et al. (2011) effectively pointed out that governance preferences will vary by actor, they did not relate their conclusion to broader governance theories.

Frohlich and Knieling's (2013) theoretical contribution to adaptation governance outlined the features of adaptation that the authors argued had led to the emergence of 'governance barriers'. These include: (1) the misalignment between the hazards presented by climate change and the jurisdictional boundaries of adapting actors; (2) the diversity of stakeholders and values affected; (3) the misalignment between the temporal scale of climate impacts and electoral or economic processes; and (4) the inherent uncertainty of climate change projections. Focusing primarily on the question of how adaptation can be mainstreamed into day-to-day government operations, Frohlich & Knieling (2013) reviewed a variety of what they considered governance sub-fields (environmental, coastal, multi-level, regional, Earth-system, participatory, risk, adaptive) and concluded that adaptation governance was still in its infancy but there was need to acknowledge these existing governance literatures rather than to start from scratch. In outlining future research directions, the authors called for empirical analysis that addressed both current and potential governance arrangements.

With an explicit focus on the role of multi-actor forums in multilevel governance, Bates et al. (2013) identified a form of network governance as prevalent in their Australian case

study sites. However, like much of the literature on adaptation governance, Bates et al. (2013) do not constrain network governance by comparing it to other modes known in the literature. Accordingly, the authors do not address instrument selection or implementation approaches as well as appear to have mostly explored adaptation in its earliest stages only. Interestingly, while the authors found that local governments and business gained knowledge regarding adaptation from network arrangements, they also found that implementation was not necessarily facilitated by the forums (Bates et al., 2013).

In a review of adaptation literature, Vink et al. (2013) argued that the political and normative aspects of governance arrangements were ill-presented and rarely addressed in most studies. Reviewing 1132 articles, the authors found that: *"a large part of the CCAG* [climate change adaptation governance] *literature conceptualized long-term policy making predominantly as a matter of getting the system right instead of understanding the interplaying processes of organizing knowledge and organizing support within those systems over time"* (Vink et al., 2013, 8). The authors therefore suggested that most adaptation research that claimed to address governance, in some form, treated governance solely as a matter of procedurally coordinating existing relations and not as a process which can be conducted via multiple competing, value-laden, theories. The authors concluded that further research into adaptation governance would need to more directly inquire into the political component of the relations of actors across different scales (Vink et al., 2013).

In the same vein, Wellstead, Howlett, & Rayner (2013) noted the distinct depoliticization of governance issues in much adaptation research. Describing the literature's engagement with governance issues, the authors criticize the 'black boxing' of governance, and its normative aspects. According to Wellstead et al. (2013, 2), most adaptation literature treats governance as a simple variable that needs calibrating rather than an *"independent determinant of policy content".* Pointing to the need to place governance aspects of adaptation as the objects of direct study, Wellstead et al. (2013, 8) call for an explicit accounting of distinct meso-level (above empirical, below universal) *"governance logics"*

(theories) in adaptation research to better guide policy making. Wellstead et al.'s (2018) visual representation of the adaptation governance "black box" is presented in Figure 4.

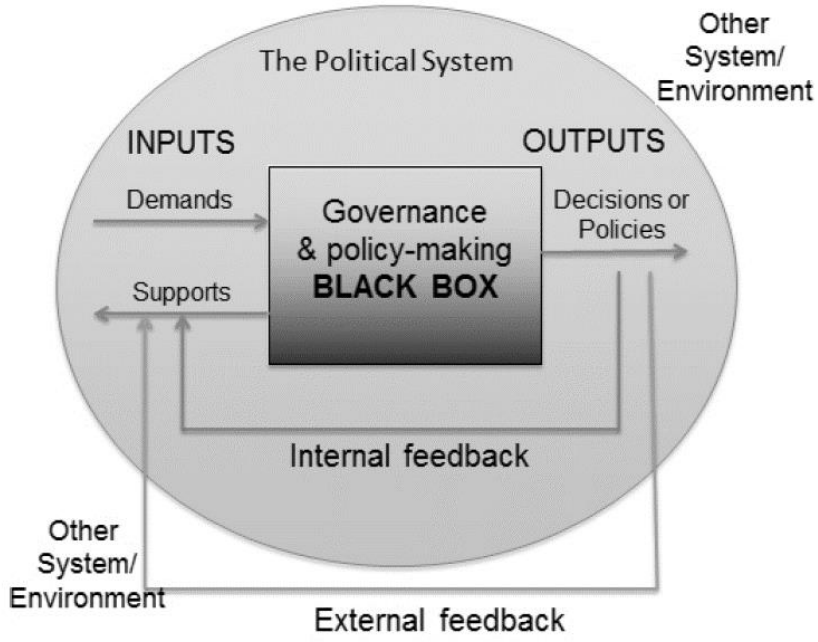

Figure 4 - Wellstead et al.'s (2013, 6) black box of adaptation governance

Finally, the most recent study reviewed here reflects the timeliness of this project and perhaps uptake of the aforementioned normative components of adaptation governance. Waters & Barnett (2018) interviewed citizens in Australia regarding climate change adaptation and compared their responses to 'spatial imaginaries' (i.e. preferred governance arrangements) aligned with hierarchy and more state involvement versus polyarchy and less state involvement. Based on 80 interviews with local residents, Waters & Barnett (2018, 720) found that:

> *Contrary to the broad trend of decentralising and sharing government with private and civil society actors around the world, even with respect to managing private assets such as houses and land, there is a strong preference for governments to*

> *regulate (to varying degrees) to ensure fairness and consistency across space and time.*

Along with this finding for government to act to ensure consistency and fairness, the authors also identified that respondents felt adaptation was too important to be left to 'softer' forms' of governance often found in polyarchic arrangements (Waters & Barnett, 2018). Along with Otto-Banaszak et al. (2011), this is the only identified adaptation study that explicitly compared visions of adaptation governance between actors.

Along with actor relations and roles explored in the literature above, two key studies have also explored policy instrument selection in relation to climate change adaptation. Mees et al. (2014) outlined a series of six criteria to identify policy instruments for climate change adaptation. Policy instruments were divided into the three common categories of regulatory, market and persuasive (as in this study). Using their framework, the authors then selected appropriate instruments based on the varying degree of certain features being present, such as: uncertainty, spatial diversity, controversy, social complexity (Mees et al., 2014).

The authors pointed out that discussion of policy instruments in adaptation has been under-represented as most answers to the question of "how to adapt" engaged adaptive capacity and physical adaptive measures rather than policy instruments and their implementation. Applying the framework to adaptation measures, such as green roofs, flood proof buildings, and heat awareness, the authors found that pairings of regulatory-green roofs, persuasion/market-flood proofing, and persuasion-heat awareness were most appropriate in their assessment. The authors called for future work comparing the same adaptive measure implemented with different instruments. The authors did not, however, engage in any empirical data collection from adaptation practitioners, stakeholders, or the public in their study.

Finally, Henstra (2016) addressed policy instruments and climate change adaptation providing a robust assessment of traditional policy instruments, their strengths and

weaknesses and their viability for adaptation. Using the conventual typology of regulatory, market, and persuasive instruments, Henstra (2016) identified that adaptation practice and scholarship is nascent and has scantly engaged questions of 'appropriate' policy instruments to implement adaptive measures. Notably, Henstra (2016) added to the typology with the inclusion of internal policy measures called 'organizational instruments', which in the typology used in this study are considered as type of hierarchical instrument of addressing the state's internal processes. Nonetheless, the additional instrument provides value in addressing intra-state adaptation, as oppose to inter-state relations and state-non-state relations at the centre of this project. As with Wellstead et al. (2013), Henstra (2016) concluded that too much adaptation research has viewed issues of governance, such as instrument selection, as solely technical matters, and thus avoided much of the policy theory literature in outside disciplines. While identifying that instrument selection will depend on the adaptive measure and the jurisdiction, Henstra (2016) called for future work which explicitly addresses the use, or interest, in policy instruments at difference scales of government. Discussing the features of various instruments, and their selection, Henstra (2016, 515) concluded:

> *These attributes affect the technical viability, political acceptability, and the economic feasibility of particular instruments in meeting specific adaptation objectives…future research on the adaptation policy making processes might investigate the relative importance that officials ascribe to these various criteria…questions remain about the optimal scale (i.e. national, regional, or local) for deploying particular instruments and the specific barriers that governments at different levels face in instrument selection.*

To summarize, adaptation governance work has made progress in broadening the analysis to multiple actors (Otto-Banaszak et al. 2011), engaging the broader governance fields (Frohlich & Knieling, 2013), recognizing the relational and normative components of government (Vink et al., 2013; Wellstead et al., 2013), and discussing preferred visions of governance (Waters & Barnett, 2018). Further, there has been effective, but limited,

engagement on the question of policy instrument selection and effectiveness (Mees et al., 2014; Henstra, 2016). Despite this uptake of the governance concept in adaptation research, significant key processes remain under-addressed in the literature (Huitema et al., 2016). While adaptation governance literature has emerged at an increased rate in the past several years, there remain identifiable gaps in both the international and Canadian literature, as will be discussed in Section 1.2.1. First, however, the following section concludes the literature review by presenting recent Canadian scholarship that has addressed various governance related questions of adaptation.

1.1.8 Adaptation Governance Research in Canada

One of the first explicit discussions of adaptation governance in the Canadian context comes from Dickinson & Burton (2011). Through analysis of existing efforts at the time, the authors noted a patchwork of adaptation taking place at local and regional levels, with no overarching approach from a national level. They described adaptation governance in Canada as an "evolving mosaic" with unclear consequences. While much adaptation research in Canada had touched on issues of governance, Dickinson & Burton (2011, 104) were unique for their unambiguous questioning of how the new problem of climate change adaptation would fit into Canadian federalism

> *When a new issue such as adaptation to climate change emerges, there is almost always some uncertainty about how the needed policies and actions will be identified, developed, and shared. Important parts of the climate change adaptation (and mitigation) debate still remain unanswered and even unaddressed: who will pay what share of the costs for adaptation of different kinds, in different places and in relation to what risks.*

Analysing the outcomes of the Regional Adaptation Collaborative (RAC) program operated by Natural Resources Canada (NRCAN), Bauer & Steurer (2014) argued that the federally-led program represented an approach to adaptation which facilitated opportunities and capacity through a networked approach. Through interviews with

Canadian adaptation practitioners and analysis of key documents, the authors contrasted the RACs with national adaptation programming in England. The authors described the Canadian RACs as 'top-down' in function and relying heavily on government agenda-setting, whereas they found the English program to be more pluralistic and 'bottom-up'. Bauer & Steurer concluded that the Canadian experience with the RACs was a mix of hierarchical and network approaches to governance, meaning there had been a plurality of input, within an overall 'top-down' structure. As will be discussed in Chapter 3, this is somewhat at odds with the overall findings of this project which identify networks modes as predominant at provincial and federal orders. The distinction is likely due to the application of different governance metrics. Where Bauer & Steurer (2014) focused on actor relations at the national and sub-national level as the determining feature in diagnosing governance modes, this study includes actor roles across multiple scales, actor relations to one another, and, crucially, policy instrument consideration or implementation.

In their case study of Ontario's Niagara region, Baird et al. (2014) argued that adaptive co-management (ACM) was an ideal means of addressing adaptation issues. Their study sought to test the viability of ACM through experimental workshops with practitioners and stakeholders. In ACM, local knowledge of vulnerabilities, values, and impacts are combined with technical analysis to foster an inventory of community needs for adaptation. Like many networked approaches, the process aims to engage local stakeholders and involve them in a continuous adaptive process through non-coercive instruments and voluntary commitment. Baird et al. (2014) and Baird et al. (2016) described the study design in which networks of adaptation practitioners and stakeholders were facilitated in the Niagara Region in order to identify if it would lead to effective adaptive action. Like Bates et al., (2013), the authors concluded that a networking approach alone was not sufficient to lead to adaptation progress. The authors identified lack of funding and political will, as well as disparate interests as the potential reasons for these results. Notably, these are known, and long discussed, limitations to network modes of governance (Borzel, 2011).

Reviewing federal adaptation programs in Canada, such as the above-mentioned RACs and the follow-up National Adaptation Platform (NAP), Wellstead et al. (2016) identified both strengths and weaknesses in the programs from a governance perspective. The authors noted both programs were highly successful in generating information about impacts and vulnerabilities, as well as promoting adaptive capacity. Conversely, they pointed out that the real challenge for climate change adaptation in Canada was in furthering instrument choice, implementation, and assessment (stages 3-5). While mostly focused on discussions of 'policy experimentation', the authors concluded a well-accepted reality in the climate change adaption community, that climate change information and adaptive capacity does not necessarily lead to adaptive action. Wellstead et al.'s (2016) study implied a key finding of this project, that the ability for multi-actor governance arrangements to foster adaptive capacity does not correlate to implementation. The authors concluded that future efforts to connect different scales of governance, which they refer to as 'policy experiments', need to account for the unpredictability of not only the climate system itself, but policy negotiation (i.e. competing values) as programs are either upscaled from local efforts, or downscaled from national agendas (Wellstead et al., 2016).

Finally, Henstra (2017) highlighted the limited body of research explicitly addressing climate change adaptation and governance theory in Canada. Working to provide some clarity and structure for future analysis, Henstra (2017) outlined the application of a policy regimes perspective, another framework that boasts a long history of application in public policy research. Using the metrics of the policy regimes framework (legitimacy, coherence, and durability), Henstra (2017) concluded that the Canadian federal government has effectively managed a polyarchic adaptation community at the national scale. The study identified that further work will need to align these findings with processes at the local and provincial scales (which this project does), as well as to address explicit mechanisms, or policy instruments, for fostering vertical coordination in climate change adaptation (Henstra, 2017).

To summarize, governance research related to climate change adaptation in Canada has begun to emerge and address key issues. However, questions requiring empirical investigation remain answered. This research has emerged in a national policy landscape that lacks any formal, single, adaptation policy in Canada. As this research has shown, adaptation policy in Canada is fractured and best described, with Dickenson and Burton's term, as a 'mosaic' of mostly uncoordinated and unrelated programs (Dickenson & Burton, 2011). This literature review (Section 1.1) has summarized the evolution of climate change adaptation and key literature that influenced the framing of this study. Additionally, the concepts of climate change adaptation and governance have been introduced and clarified, as it is at the point of their confluence that thesis adds. The following section (Section 1.2) identifies gaps in knowledge from the above literature, before outlining the research questions, design, and methods used to address these gaps.

1.2 Research Design

1.2.1 Literature Gap

Based on the analysis of the literature presented in the previous sections, this section identifies literature gaps that are subsequently the starting point for the thesis' research questions, design, and methods. After discussion of the literature gaps the section presents the study design developed to answer a series of research questions. The section concludes with discussion of the projects epistemological and ontology position before Section 1.3 address the applied research methods.

While adaptation governance research is expanding, certain questions, especially in the Canadian context, remain unaddressed. This section highlights three identified gaps in the existing literature which informed the research questions of this study. Although the focus of the research is on the Canadian context, the project was designed to contribute to both Canadian and international adaptation communities though its connection of Canadian illustrations to broader governance theory.

First, as discussed, adaptation governance literature rarely engages theoretical frameworks of multiple governance modes from the governance literature. In the Canadian context, with the exception of Bauer & Steurer (2014), studies have not engaged openly in discussion of competing theoretical governance arrangements in reference to current processes of how actors interact around the issue of adaptation. For the most part, this is also the case in the international literature as well, as indicated in the literature review; with Otto-Banaszak et al. (2011) and Waters & Barnett (2018) as noted exceptions. In this sense, the current state of adaptation research lacks reference to analytical frameworks of governance. This has the result of poorly constraining the description and understanding of existing forms of adaptation governance. Overall, with few exceptions, it is argued that adaptation research is limited in consideration of governance theory for its value in discussion, comparison, or critique of current processes and insights.

Second, existing empirical adaptation research is limited in addressing governance features (actors, roles, instruments) as the primary objects of study via insight from multiple scales of governance. Therefore, there is a need for work that directly identifies these features as well as does so with data from multiple sources (multiple scales, both government and non-government) in order to offer a robust description of the ongoing governance arrangements of adaptation. In the Canadian case, most research focuses on one or two orders of government, usually the local scale (Burch 2010; Picketts et al., 2012; Henstra, 2012; Bauer & Steurer, 2014; Baird et al., 2014). While some studies do include primary data collection from multiple orders of government and types of actors (Bauer & Steurer, 2014: Wellstead et al., 2016; Oulahen et al., 2018), there remains a need to more explicitly describe and contrast discrete governance modes via primary research. These same general limitations can be identified in the international literature as well. In short, there is need for enhanced theoretically-informed approaches to robustly describing current adaptation governance via insights from multiple levels of government, (and NGO, and industry if possible), thereby enhancing the contribution of governance scholarship to adaptation challenges.

Finally, research has most-often approached governance as a pressing but relatively uninterrogated aspect of adaptation (Wellstead et al., 2013). As a result, barriers to adaptation efforts are often attributed to (non-discrete) governance arrangements, most notably in the case of relationships between orders of government at local and higher scales. However, these relations themselves have not often been the focus of inquiry. Specifically, the literature on barriers has implied a misalignment in approaches to adaptation between orders of government, and studies have hinted at, but not fully addressed, that this may be the result of different governing perspective across scales (Urwin & Jordan, 2008; Amundsen et al., 2010; Juhola & Westerhoff, 2011; Measham et al., 2011: Carlsson-Kanyama et al., 2013; Oulahen et al., 2018). Currently, there is no research explicitly comparing adaptation governance process and preferences between practitioners at different scales. Apart from Otto-Banaszak et al. (2011) and Waters & Barnett (2018), adaptation research has focused almost entirely on current governance, and there is a need to compare governance *preferences* among relevant groups. The research gaps are summarized in Table 1.3.

Table 1.3 - Identified research gaps in the adaptation governance literature

Research Gap 1	Research Gap 2	Research Gap 3
Adaptation governance literature has yet to fully engage broader theoretical frameworks of governance.	Adaptation governance remains in need of robust characterization of current modes of governance with multi-scale and theoretically informed primary empirical analysis.	While adaptation governance research has implied that 'governance barriers' emerge via the misalignment of approaches between local and higher-order governments. Governance preferences between these scales have not been compared.

1.2.2 Research Questions

The first research question this project examines is the value of an established governance framework for climate change adaptation. The analysis is expected to illustrate how governance as an analytical framework can help adaptation scholars identify, describe, critique, and contrast adaptation arrangements across sectors, places, scales or impacts. As

the above literature review suggests, adaptation governance remains amorphous, with few efforts to provide conceptual clarity regarding the objects of study and means of critique or assessment (Frohlich & Knieling, 2013: Henstra, 2017). It is proposed that with a clear theoretical framework guiding researchers, adaptation governance will avoid becoming (or remaining) disjointed and unwieldly as the objects of study vary drastically and are not comparable. The governance framework applied here contains discrete objects of study to be identified (roles, relations, instruments) and distinct logics of competing governing logics such as command, barter, convince, or volunteer. Importantly, the framework, through its competing modes, does not omit the normative aspects of governance (Tenbensel, 2005; Meuleman, 2008; Hall, 2011). It's application thereby also aims to contribute to the need to more-clearly engage the politics of adaptation governance (Wellstead et a., 2013; Eriksen et al., 2015; Henstra, 2016). The analysis of adaptation processes and structures with such a framework then is proposed to not only add analytical clarity but to lay the groundwork for descriptive, comparative, and critical assessment of adaptation governance.

The second research question of this project relates to how adaptation is currently being governed by describing current processes in a robust, theoretically informed, manner. By placing components of governance as the direct objects of study across multiple scales of governance, this research will thoroughly identify the current mode(s) of adaptation governance in illustrative case study locations. Using the Canadian context, the question aims to characterize processes at multiple scales of governance to offer a description of the current governance of adaptation. In addressing this research question, the study then seeks to 'map' the current governance of climate change adaptation in Canada. As discussed above, while there are parts of an answer to this question in the empirical research, they can only be inferred, as few studies explicitly diagnose current governance arrangements in relation to existing theoretical frameworks or with primary data from multiple scales (see below). Doing so with an established governance framework is also expected to allow for the leveraging of the large body of knowledge in interpreting the results and addressing emergent policy issues (Hall 2011; Pahl-Wostl 2015).

The third research question is a direct response to a component of the adaptation literature; namely, the barriers literature that points to 'governance issues' emerging from the relations between local and higher order governments. Like the second research question, the answer to this third question can be inferred from existing research, but existing works rarely compare visions or preferences for governance arrangements among key stakeholders (e.g. government, public, or private). With the exception of Otto-Banaszak et al. (2011) and Waters & Barnett (2018) who indirectly explore governance preferences amongst the public in Australia (the authors don't use governance terminology), this project has identified no other explicit empirical analysis of governance preferences amongst a relevant population of adaptation practitioners or stakeholders. As identified in the literature review this is likely due to governance being treated as an outcome, rather than a process in itself, and the depoliticization of adaptation governance, in which alternative modes are rarely addressed. Ultimately, there is need to answer whether governance barriers regarding coordination between local and higher order governments are the result of a misalignment of visions for effective adaptation governance. The research questions are summarized in Table 1.4.

Table 1.4 – Thesis research questions

Research Question 1	Research Question 2	Research Question 3
Can an established governance theory framework offer clarity in conceptualizing different approaches to governing adaptation?	Based on a robust set of insights from practitioners at multiple scales, what are the current dominant modes of adaptation governance in Canada?	What preferences exist amongst adaptation practitioners regarding governance arrangements and do visions differ by order of government?

1.2.3 Study Design

In order to adequately answer the research questions identified above, it was decided to undertake a multi-case study analysis of the governance of adaptation in Canada. Because

the study of adaptation governance across all scales and actors in Canada is not feasible, it was concluded that adaptation processes at the federal level, as well as two provinces, and their major metropolitan areas could act as significant illustrative case studies representative of adaptation governance across Canada. By collecting data on actor roles, actor relations and policy instruments in multiple sites across multiple scales, the project would be able to identify the value of the governance typology (RQ1), develop a robust account of adaptation governance as it is (RQ2), and offer insight from those involved regarding governance preferences (RQ3). While not being a comparative study in the strictest form, the multi-case study (i.e. two provinces, multi-municipality) design provides for some comparison but, more importantly, a broader data set for insights on adaptation governance in Canada (Stratford & Bradshaw, 2016).

Case studies are also useful for contributing to theory development, as Baxter (2010, 81) notes:

> *…case study research involves the study of a single instance or small number of instances of phenomenon in order to explore in-depth nuances of the phenomenon and the contextual influences on and explanations of that phenomenon.*

For this study, the phenomenon of interest is the governance of adaptation, recognizing Baxter's (2010, 82) claim that:

> *…this depth of understanding* [from case studies] *may concern solving practical/concrete problems associated with the case or broadening academic theory about the phenomenon in general, or a case study may do both of these things.*

From the perspective of broader governance literature, this project should be seen as a theory-testing multi-case study in that it is mostly inductive and does not aim to generate new theory, but applies an existing framework (Baxter, 2016). Conversely, in its relation to adaptation scholarship, the multi-case study could be seen as partly theory generating,

or deductive, at least in relation to adaptation-specific knowledge which emerged from the novel design and analysis.

Regarding site-selection, two provinces were chosen to maintain a research design of reasonable scope; with one highly populated province and one lesser-populated province representing multiple conditions of the Canadian context. Further, based on a review of existing research on climate change adaptation in Canada, it was recognized that significant attention had been paid to the coasts (Burch 2010; Jones 2011; Picketts et al. 2012; Oulahen, 2018) and the Arctic (Ford & Pearce 2012; Ford et al. 2013). However, research on adaptation in central Canada has been relatively lacking, so the project sought to provide novel insights for the academic scholarship on adaptation in central Canada. Manitoba was chosen as one case due to a distinct lack of academic research addressing actions in the province. Ontario was chosen as a second case site, since it was expected to be significantly distinct from the Manitoba case and could therefore enrich the breadth of the data via 'dislike paring' (Stratford & Bradshaw, 2016). The political geography of the two provinces is notably different. Manitoba contains a single major city (Winnipeg) and only one other population centre larger than 40,000 residents (Brandon). By contrast, Ontario contains multiple cities over 100,000 residents as well as Canada's largest metropolitan centre, the Greater Toronto Area (GTA).

For analysis at the city scale, the largest cities and provincial capital of each province (Toronto and Winnipeg), as well as adjacent or major cities nearby were selected for analysis of adaptation governance features (Brandon, GTA-adjacent municipalities). The City of Winnipeg has a population of roughly 750,000 (City of Winnipeg, 2017) and is governed though a unicity amalgamation of previously separate city councils. The combined metro area of the city has a population of roughly 825,000 with the adjacent municipalities being entirely rural. The city of Brandon is the only other major city in the province, it is located roughly 200 kilometers west of Winnipeg and has a population of nearly 50,000. In the Ontario case, the City of Toronto is a municipality within the Greater Toronto Area (GTA), a heavily urbanized region of southern Ontario on the shores of Lake

Ontario. The City of Toronto has a population of about 2.9 million, while the GTA is home to more than 6.3 million (City of Toronto, 2018). The GTA does not have a formal, overarching governance entity except for certain special service bodies relating to transit. Individual city councils govern the municipalities that make up the GTA; these councils represent other highly-urbanized centres such as Mississauga, Brampton and Markham. Unique to Ontario, some of the municipalities in the GTA are combined into "regions" or "upper-tier" municipalities. These upper-tier municipal entities act as service providers and governing bodies for multiple "lower-tier" municipalities. Major upper tier municipalities in the GTA include Durham Region, Peel Region, Halton Region, and York Region.

1.2.4 Ontological & Epistemological Framework

Ontologically, this project is informed by both a post-positivist view of nature and reality, and a critical, constructivist view of social phenomena. Regarding the former, while the project doesn't explicitly engage in analysis of the objectivity of climate change information or claims to the reality of environmental understanding through scientific methods, it accepts a post-positivist interpretation that empirically rigorous interpretations of the climate and environmental system are accurate, though not universal (Guba & Lincoln, 2004). The consequences of this post-positivist view are that a constructivist, malleable, physical reality is not assumed, and while normative components of the scientific method are recognized, they are not perceived to be actively shaping reality, but, instead, actively shaping our understanding of it; in short an objective physical reality is assumed to exist (Guba & Lincoln, 2004).

Social phenomena are taken to be largely constructed and, inline with the wider perspectives of critical theory, seen as the manifestations of normative, and subjective interpretations of social processes. For example, the governance framework used in this project is not assumed to be a series of objective descriptions of social 'reality', as much as a normatively constructed means of ordering and analysing complex social processes. In this critical constructivist paradigm, knowledge is interaction/dialogue with social processes, as well as its interpretation (hermeneutics) (Guba & Lincoln, 2004; Hesse-Biber

& Leavy, 2004). Epistemologically, this means that the project assumes the relationship between the researcher, research findings, and any apparent reality (ontology) is interpretative and bound in the relationship between the researcher and the research process (including interacting with participants during data collection, analysis and writing (Guba & Lincoln, 2004; Babbie & Benaquisto, 2010; Mansvelt & Berg, 2016). The ramifications of these ontological and epistemological is reflected in the selection of research methodology, means of rigour, and operationalized methods described in Section 1.3.

1.3 Research Methods

1.3.1 Qualitative Research Methods

Qualitative research aims to immerse a researcher within social structures and processes, as well as the experiences of individuals and groups within these structures for the purpose of communication and interpretation (Winchester, 2014; Mansvelt & Berg, 2016). Winchester (2016) elaborates on the distinction between research that asks questions of social structure, and research that asks about the experiences within them by highlighting that the two questions are not necessarily separate, but that most qualitative research in geography falls within one of the two categories. Applying this perspective to the questions discussed in Section 1.2.2, this project uses a theoretical framework to identify processes (governance) of climate change adaptation via the insights of individuals within, and making up, this governance. For this project's goals, qualitative research methods offer the necessary epistemological alignment (see Section 1.2.4) and methodological tools to learn about governance via individual's experiences.

As presented in Table 1.5, this project operationalizes three research methods: document review, in-depth interviews, and expert workshops. Together the methods combine to provide both rigour and breadth so to increase credibility, dependability, and confirmability of the project (Baxter & Eyles, 1997; Winchester, 2016).

Table 1.5 - Research questions paired with appropriate research methods

Research Question 1	Research Question 2	Research Question 3
Can an established governance theory framework offer clarity in conceptualizing different approaches to governing adaptation?	Based on a robust set of insights from practitioners at multiple scales, what are the current dominant modes of adaptation governance in Canada?	What preferences exist amongst adaptation practitioners regarding governance arrangements and do visions differ by order of government?
Research Methods		
Document review	Document review & in-depth interviews	In-depth interviews & expert workshops

1.3.2 Method Selection and Data collection

For data collection, three methods were selected to identify actor roles, actor relations, and policy instruments in the case-study sites, these are: key document review, in-depth interviews, and workshops. It was decided that adaptation documents (plans, policies, reviews) from the governments of the case-sites would provide necessary initial insight into ongoing actor roles, relations, and policy instruments. Additionally, documents from NGO, research institutions, and some private industry would also be sought to complement the government documents. For the main source of data, in-depth interviews were chosen for the method's ability to provide the familiarity required to understand individual's experiences within social systems. It was decided that in-depth discussion with those closest to adaptation processes would allow for the necessary insights relevant to Research Questions 2 and 3 on the current as well as *preferred* modes of governance at different scales.

For interview respondents, adaptation practitioners including governmental and non-governmental professionals involved in adaptation planning, policy, or programing were identified as key targets. Both sets of respondents would have insight into adaptation governance across their case sites (actor roles, actor relations, policy instruments) and the inclusion of government and non-government actors at all three scales of Canadian governance would broaden the data for a more robust account. Finally, workshops regarding the same questions with participants from multiple scales of governance were

selected as a third method to add confidence to the analysis of documents and interviews. Workshops allow for the collection of multiple insights at the same time (Cameron, 2016) as well as can provide additional understandings through the observation of discussion among respondents. All three research methods are expanded up in Section 1.3.3 through 1.3.5.

In designing the study, and specifically identifying interview participants for the core data collection, a question emerged as to whether to focus on practitioners with specific policy sectors (e.g. health, agriculture, transport), specific hazards communities (e.g. flooding, heat), or within the case sites as a whole. As discussed above, much adaptation scholarship avoids addressing a distinction between sectoral, place-based, and impact-based approaches. However, because response rates and accessibility were unknown, and because it was identified that there was not necessarily an abundance of adaptation practitioners in Canada, interview invitations were not limited by sector or impact (in order to assure a workable response rate).

Interview invites were extended to all adaptation practitioners identified in the case sites through the description of their positions on government websites, existing knowledge of adaptation practitioners, and review of key documents (Stratford & Bradshaw, 2016). Ultimately the consideration of specific sectors rested on access to practitioners. Interview requests were then sent to non-elected officials in government starting from the position of assistant deputy minister downwards. Inclusion criteria included: experience in adaptation initiatives and programs as identified in document review, currently positioned in a role directly linked to ongoing adaptation initiatives or having been suggested by other contact. Non-governmental respondents were identified from key documents, online searches of key adaptation organizations, and snowball sampling (Patton, 1990).

The practice of invoking practitioner insights is common in policy and governance research but comes with both strengths and weaknesses. Practitioner research has been fruitfully applied in much other adaptation research (Urwin & Jordin, 2008; Henstra, 2012; Bates et al., 2013, & Oulahen et al., 2018). Practitioners here are defined as professionals in

government, industry, research or academic sectors who specialize in adaptation based on their experience and job title. A majority of those included in this study were civil servants at various orders of government. The value of interviewing people in such positions rests in their in-depth knowledge of the daily workings of policy processes including meetings, topics discussed, and reasons for action or inaction. When offering civil servants anonymity in reporting of interview responses (see below), it further provides a more genuine insight into governance processes (Duke, 2002). As discussed later, the challenge of working with data from practitioners includes the recognition that they were not always senior government and elected officials, and while intimately familiar with policy processes, are not final decision makers.

Field work took place between 2015 and 2017, with interviews being conducted both in-person and via phone. After interviews were complete, the data were found to adequately cover several sectors, namely environment and transport/infrastructure across all orders of government in both case sites. (Table 1.6). As other adaptation studies have identified, it can be difficult to capture equal representation of sectors in empirical research, but combinations of multiple sectors will provide adequate insight into broad adaptation experiences (Bates et a., 2013). Distinctions between sectoral responses were explored in analysis but are not discussed in great length in this project, as disparity was overall lacking. In all case sites (federal, Ontario, Manitoba, GTA, and Winnipeg) at least one relevant NGO or Private organization was represented. In both Toronto and Winnipeg, community scale organizations were also represented. In March 2017, after a majority of the interviews had been conducted, two workshops were held with adaptation practitioners from across government and non-government sectors (see below).

Table 1.6 Interview respondents by sector across order of government/non-government

	Environment	Transportation/ Infrastructure	Health	Other Sectors
Federal Government	✓	✓	✓	✓
Government of Ontario	✓	✓		✓
Government of Manitoba	✓	✓	✓	✓
Greater Toronto Area	✓	✓	✓	✓
Winnipeg & Brandon	✓	✓		✓
Non-Governmental	✓	✓		✓
Private Industry		✓		✓

1.3.3 In-depth Interviews

While interviewing is often considered an ideal manner to gain insights into personal experiences, such experiences, especially if the number of interviews is large, can also provide necessary insight into social structures (governance modes) and policy processes (climate change adaptation) (Dunn, 2016). As Winchester (2005, 9) states: *"people's own words tell us a great deal about their experiences and attitudes, but they may also reveal key underlying social structures".* As discussed, in-depth interviews were identified as an effective method to address research questions 2 and 3 of the project, since reliance on secondary and official textual sources could not necessary provide the depth of description of governance processes as they are, and certainly not as they are preferred. Further, the anonymity guaranteed to interviewees is believed to foster more honest insights beyond the 'official line' (Duke, 2002). Because of this, respondent names and positions are not identified in the thesis.

Email invitations were sent to key government and non-government practitioners identified in the document review as well as to individuals holding key relevant positions in case site governments. Further contacts were developed through snowball sampling as interview

respondents would suggest other key informants (Patton, 1990). In total, 174 interview invitations were emailed directly or though online contact forms, with 87 respondents agreeing and 82 interviews taking place (5 positive respondents had, in the end, scheduling conflicts). One audio file was accidently deleted leaving 81 interviews in the data set. In the end, a clear majority of pre-study "essential" key informants identified from the document review were accessed and interviewed, with only two or three "ideal contacts", or organizations, not accessed.

As mentioned, the in-depth semi-structured interviews were conducted in person and via phone with adaptation practitioners from all three orders of government in both provinces (Winnipeg, Brandon, Toronto and GTA, Manitoba, Ontario, Canada), as well as relevant non-governmental actors in each case site. Interviews ranged in length from 45 to 90 minutes, with the average interview lasting approximately 55 minutes. The in-person interviews were conducted in the professional workplaces of the respondents. In a few cases, coffee shops, restaurants, and bars were used at the respondent's request. All interview locations were left to the respondent's choice and there were no cases where the researcher felt an interview locale was inappropriate.

Eventually the data set was considered to be saturated as key respondents in each site consistently referred to others who had already been interviewed when asked about additional ideal interview candidates. These interactions assured that an effective sample of respondents had been contacted or involved through a mix of purposeful and snowball sampling (Patton, 1990). After initial analysis, 55 of the richest interviews were coded line by line in detail using NVivo qualitative analysis software. These selections were based on the richness of the conversation, relevance of experience, and to better balance the data across source types. As is common in interview methodology, not all interviews addressed each question or ended up being entirety fruitful. In some of these cases the decision to not code in detail was made because respondent was new to their position or had very limited experience with adaptation. Additionally, some respondents spoke at length to initiatives or experiences not within the purview of the study (namely climate change mitigation).

Nonetheless, the remaining 26 interviews remained in the data set via in-depth researcher notes made during the interviews and revisiting of the audio files for complements to key themes identified in the 55 depth-coded interview transcripts.

Given that climate change adaptation is still in nascent stages as a policy field, especially within smaller governments, this sample size is seen as considerably large. For reference, other studies in adaptation have worked with data from: 31 key informant interviews across seven countries (Otto-Banaszak et al. (2011); 47 key informant interviews across 2 countries (Juhola & Westerhoff, 2011); 33 key informant interviews within a single country (Measham et al., 2011); 19 practitioner interviews across federal and provincial orders in Canada (Bauer & Steurer, 2014); 80 random sample (general public) interviews within Australia (Waters & Barnett, 2018); and 31 practitioner interviews in one province (Oulahen et al., 2018).

Interview respondent characteristics are outlined in Table 1.6. Again, to protect the anonymity of the respondents, their positions are never identified beyond their order of government in reporting. The interview guide (Appendix B) followed five basic themes: (1) existing experience in adaptation, (2) identification of key actors and their roles in adaptation, (3) preferred roles for adaptation actors (levels of government, industry, NGO, academic, etc.…), (4) existing and desired instruments (categorized broadly as regulatory, market, and voluntary), and (5) barriers to effective adaptation governance.

Table 1.7 - Number of interviews by respondent category

	Interviews	**Depth Coded**
Canadian Federal Government	13	8
Ontario Provincial Government	13	8
Manitoba Provincial Government	18	15
Greater Toronto Area	14	9
Winnipeg & Brandon	6	4
Non-Governmental Local	7	5
Non-Governmental (regional/national)	10	6
Total	**81**	**55**

Techniques for controlling the interview, or constraining respondents within the timeframe and topics of interest, were taken from both academic and popular sources. The overall interview style of the researcher was a combination of formal techniques identified from multiple sources in the qualitative methods literature (Ostrander, 1995; Cloche et al., 2004; Miller & Crabtree, 2004; Dunn, 2016). While generating effective responses necessary for the research was aided by cues discussed in the academic literature, establishing positive rapport, engaging in comfortable dialogue, and maintaining control of the conversation's direction was additionally aided though observation of non-academic expert interviews throughout the research. For this, a weekly mixed martial arts vodcast and its host professional journalist Ariel Helwani, was paid particular attention to by the researcher as it included expert interviews, both in-person and (crucially) over the phone, with full view of the interviewer at all times. As a young scholar previously inexperienced with interviews, it is believed that regular viewing and mimicry of an accomplished interviewer (whether popular or academic) aided significantly in the development of interviewing skills and therefore the quality of the data collected (especially regarding telephone interviews).

Once interviews were complete, the audio files were transcribed through slow motion listening and manual transcription via word processing software. Though automated transcription, or purchasing of professional transcription services, were available, manual transcription was preferred as it acted as an initial round of analysis to re-visit and further familiarize with the interview data (Cope, 2016). Coding of the interview transcripts was then conducted in two stages. The first round consisted of open coding, highlighting and tagging of text, allowing emergent themes to be identified (Cope, 2016). In this stage, interview transcriptions were coded through close reading for themes related to broad existing conceptual categories of both the interview guide and the governance framework driving the study: current roles, desired roles, current instruments, and desired instruments.

This open coding was not entirely free of pre-existing concepts as code sorting was based on the conceptual categories drawn from the theoretical framework of governance modes described in above and in Chapter 2. Nonetheless, consistent with the method outlined by

Babbie & Benaquisto (2010), all specific codes (identified roles, instruments) within each broad category emerged entirely from the interview data and therefore were not applied beforehand. An example of how codes were sorted within the NVivo program is presented in Figure 5. These sorted codes and cross references were effective in aiding the efficiency of data analysis. While general themes had been surmised during interviews transcription and reading of interview notes, the NVivo software provided additional confidence in key themes. For example, when drawing conclusions, it was possible to develop queries of "actor roles" + "local governments" + "preferred" amongst "federal respondents" in order to review every instance in which a federal respondent spoke to their vision of preferred local government roles in adaptation governance.

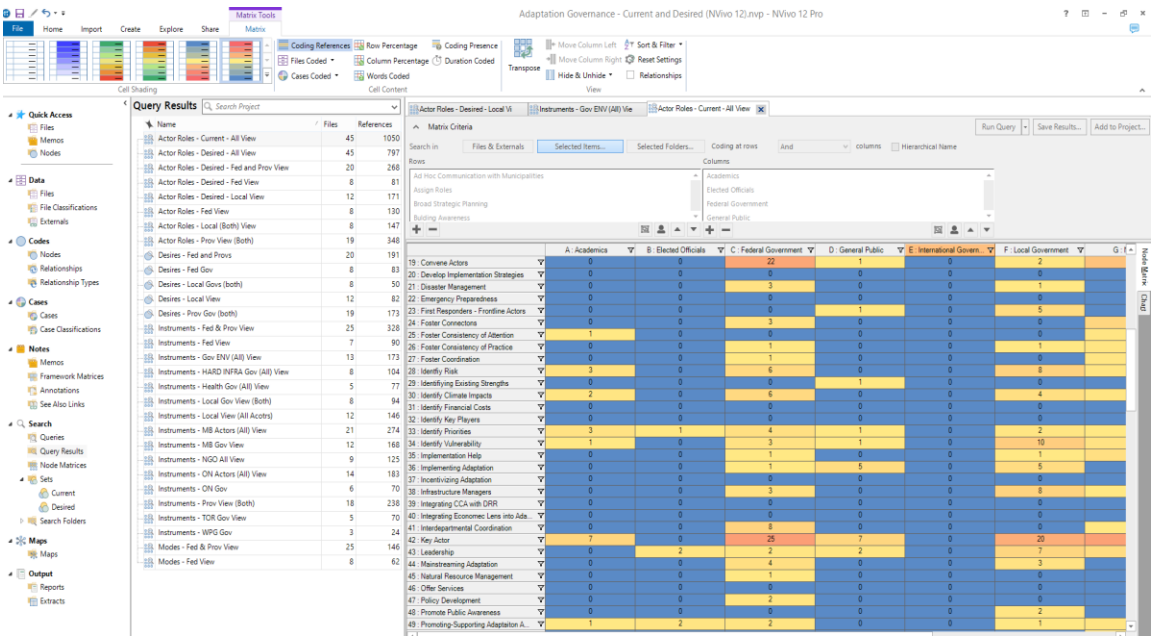

Figure 5 - Example of "Actor Roles" + "Current" amongst "All" respondents data sorting in NVivo, used to help identify emergent themes. Each cell could be selected to show all text coded to that cross-reference.

Research notes were made throughout the coding process to flag central themes and findings. The cross-referencing queries were particularly useful for identifying, or confirming, the relationship between themes and types of practitioners. As is common in

qualitative research, the queries' numerical outcomes were used as support rather than determinants of conclusions (Sadowski, 2001; Hesse-Biber & Leavy, 2004; Cope, 2016). A second round of analysis, which included further coding of interview transcripts based on codes that had emerged since the first round, was conducted throughout the writing process. Similar codes were merged to ease analysis as well (Cope, 2016). Additionally, interview transcripts were listened to throughout the research and writing process and notes made in a binder that was referred to during analysis and writing. Key themes identified during transcription and coding were also explored with supervisors to further challenge the researcher's interpretations. Figure 6 provides an example of the NVivo numerical query interface used to support key theme identification and conclusion drawing.

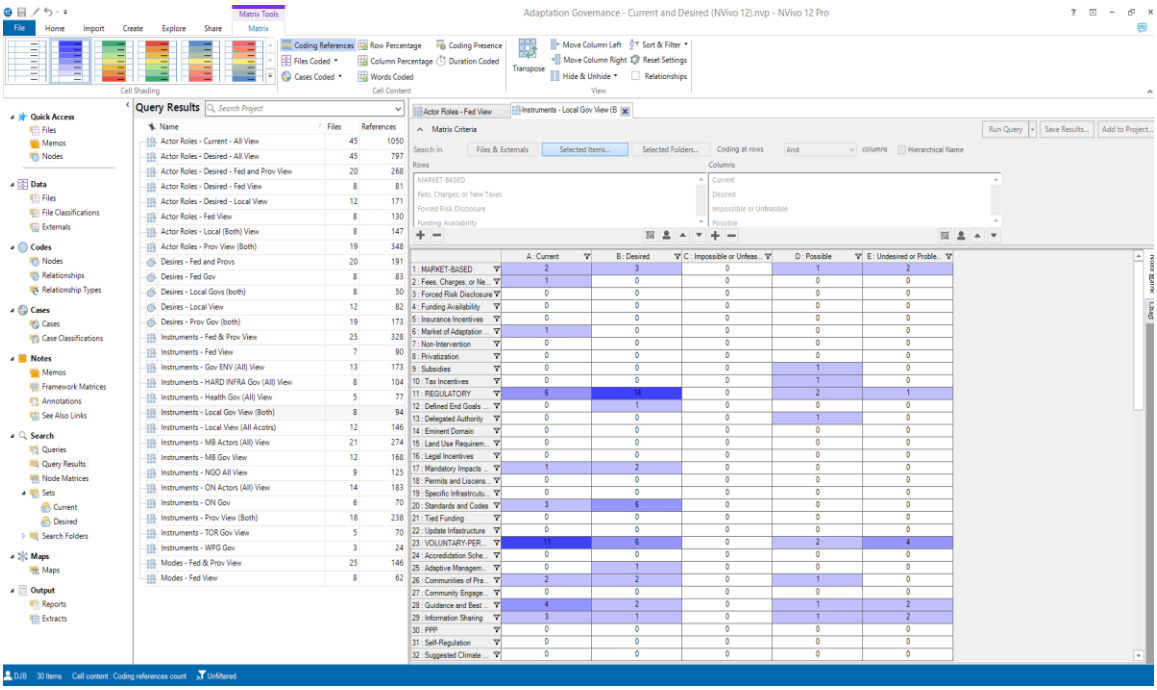

Figure 6 - Queries and numerical values drawn from NVivo coding used to aid dominant theme identification

1.3.4 Multilevel Expert Workshops (Focus Groups)

Workshops were used as a complimentary research method that could aid in confirming or presenting challenges to the interview data through triangulation (Stratford & Bradshaw,

2014). While they were referred to as workshops, as is more aligned with common terminology in Canadian government, from a qualitative methods perspective, there were ostensibly focus groups as described by Davies, Hoggart, & Lees, (2001), Cloke et al., (2004), and Cameron, (2016). In the case of multi-level, multi-actor projects such as this, the workshops were also identified as a valuable means of gathering information from an alternative researcher-respondent interaction (Cloke et al., 2004). While there was some initial expectation that differences in major themes might emerge due to the open, non-confidential, nature of the workshops, this was not the case. As is briefly discussed in Chapter 4, results of the two workshops did not offer major deviation from the themes identified in interview data.

Workshops were convened in Toronto, Ontario on March 3rd, 2017 and in Ottawa, Ontario on March 6th, 2017 and were roughly 5 hours long. Key informants in the field of climate change adaptation were invited, as well as upper level officials from major adaptation related ministries in the Ontario provincial government and the Federal Government. Ideally a third would have been conducted in Manitoba, but the logistics of travel and access did not allow for this during the research process. In total, between the two workshops, fifteen adaptation practitioners took part, representing all three orders of government active in Ontario and decades of experience in the adaptation field; comprising some of Canada's leading figures on the issues of climate change and environmental policy. Workshops were designed and facilitated by the researcher with help from his advisor and a colleague.

To begin the workshops brief presentations were delivered on the impacts of climate change in Canada and this study. The discussion period of the workshops included two components. In-line with research question 3, the workshops were designed to allow practitioners to build off existing experiences and then conceptualize an "effective" governance arrangement for climate change adaptation in Canada (i.e. preferred governance modes). This design was developed in-line with much of the literature on visioning (or backcasting) exercises (Dreborg, 1996) in which participants are asked to

outline a future scenario. The visioning technique has been used in past adaptation research (Sheppard et al., 2011; Carlsson-Kanyama et al., 2013). During the workshops, the idea of 'effective' was left intentionally vague so participants would provide their own visions of 'effective' adaptation governance. While this meant that some of the workshop time was lost to discussions of what effective governance meant (as opposed to describing visions of effective governance), it was deemed better than the researcher applying a particular effectiveness metric that might bias responses towards one mode or another. The workshop was facilitated in two sets of discussions, Discussion 1 questions were as follows:

> **Question 1:** Based on your experience and professional insight, in conceptualizing an effective form of governance for climate change adaptation in Canada, what components do you see as being present?
>
> **Question 2:** Going through this list of the components of an effective form of governance for climate change adaptation, which actor(s) might be able to, or perhaps should, provide these components?
>
> **Question 3:** Going through the list of actors we've discussed and the roles they may play in the governance of climate change adaptation, what kind of mechanism (tools, policy instruments, programs, projects, etc.) could be used to developed, or deliver, components of effective adaptation governance?

After a lunch break, discussion 2 focused on barriers to the components of effective governance, as well as potential strategies for overcoming the identified barriers. The questions in Discussion 2 were as follows:

> **Question 1:** In exploring the visions we have identified for effective forms of adaptation governance in Canada, in the instance that these components are yet to manifest, what barriers can be identified that prevent progress on effective governance?
>
> **Question 2:** What strategies could be put forward to overcome these barriers?

Data from the workshops in the forms of whiteboard images and notes were reviewed and coded by the researcher and a college in order to identify key emergent themes. Along with contributing to the answer of Research Question 3, the workshop data were summarized for a seventy-page policy report (Bednar et al., 2018). The design and outline of the workshop report, as well as 3 of its 5 chapters were authored by the researcher. The document was sent to workshop participants for review twice during writing and was then published by the Institute for Catastrophic Loss Reduction (ICLR) (Bednar et al., 2018). A third workshop with the same design was held in Vancouver, British Columbia in March 2018 allowing for additional discussions and views to be heard. The data from the Vancouver workshop was not part of this project, but a report based on the workshop was published by the Simon Fraser University Adaptation to Climate Change Team (Bednar et al., 2018b).

1.3.5 Key Document Review

Finally, while secondary data sources such as documents sometimes only provide the 'official line' and are mainly helpful in describing structures over process (Duke 2002; Cloke et al., 2004), a review of key climate change adaptation policy documents and reports was deemed a useful first step and addition to the research process. While some case sites had sparse literature available to review, other sites had numerous documents to explore ranging from workshop reports, summary papers, and status reports programs, to polished policy plans. Key non-governmental documents were also reviewed, particularly, reports summarizing adaptive initiatives in the Canadian context, such as *Cities Adapt to Extreme Heat* (Guilbault et al. 2016) and *Cities Adapt to Extreme Rainfall* (Kovacs et al., 2014) from the Institute for Catastrophic Loss Reduction (ICLR). A summary of the number of documents by type is provided in Table 1.8, however much information on government and NGO adaptation activity was also gathered from official websites (as reported in Chapter 2), or presentations available online, and do not appear on the list. In cases where documents were produced by non-governmental entities with government support, or in partnership, they are listed under that government (the higher order government in the case of multiple). A full list of reviewed documents is listed in Appendix A.

Table 1.8 - Documents reviewed by site (full list in Appendix A)

Government of Canada	30
Province of Ontario	11
Province of Manitoba	19
City of Toronto	21
Greater Toronto Area	8
City of Winnipeg/ City of Brandon	2
Total	**91**

Often, documents addressed broader environmental or climate change topics, and many had only small sections on adaptation. A majority of the referenced documents were sourced from the Canadian Adaptation Library funded by Natural Resources Canada. Notably, comprehensive third-party reviews of adaptation progress in Canada by the federal Commissioner for Sustainable Development (Auditor General of Canada, 2017), as well as the provincial Auditor Generals of Canada (Auditor General of Canada, 2018) provided key insights into the current state of adaptation across Canada, and, unlike many other documents, were entirely related to adaptation. Though these reports were released towards the end of the research project, as discussed in Chapters 2 and 3, their findings were strongly aligned with early analysis of documents and interviews. In this sense the two reports of the Auditor Generals verified much of the project's conclusions. The insights gathered from documents are largely incorporated into the empirical examples of Chapter 2 and the description of current governance in Chapter 3 (as complimentary to interviews).

1.3.6 Ensuring Rigour

In order to pursue rigour in the research design, and specifically in the primary interview methodology, a number of common practices were adhered to following Baxter & Eyles (1997). In their study on the rigour in qualitative research, Baxter & Eyles (1997) outline four key criteria: credibility, transferability, dependability, and confirmability. Regarding the first, credibility, *"refers to the connection between the experiences of groups and the concepts which the social scientists uses to recreate and simplify them through interpretation"* (Baxter & Eyles, 1997, 512). Of the means outlined by the authors to strengthen credibility, this study employed several.

Purposeful sample was operationalized to interview respondents who were known to have significant experience in the processes and structures of adaptation governance. To further assure this, the beginning of each interview included a "tell me about your experience with adaptation" question to assure that the respondent indeed had the desired experiences the research aimed to explore. Additionally, the interview guide was consistent throughout the research process, with the exception of slight alterations to question order or phrasing, the interview themes remained the exact same throughout the study for all 81 respondents. The study also benefited from triangulation in which the document review and workshops worked to confirm, or challenge, the findings of the in-depth interviews. As is evident in Chapters 3 and 4, respondent perspectives are provided mostly verbatim and with as much length as is reasonably necessary (features of verbal communication. such as 'ums' and 'hmms', are edited out of respondent quotes).

Additionally, in-situ member checking was followed in which respondents' major statements were followed up on and clarified (Walker, 2017). It was noted that traditional member checking, which looks for commentary rather than confirmation, can require a large commitment of time and resources that may or may not add useful information to the study (Walker et al., 2014). This in-situ member checking was part of the robust interview methodology which employed strategy of repeating statements back to respondents and using prompts such as "so is it fair to say that…" (Miller & Crabtree, 2004; Denzin, 2004). An additional form of checking was also conducted in the workshops and with colleagues and advisors intimately familiar with the adaptation community (Stratford & Bradshaw, 2016).

Regarding transferability, the multi-case design is intended to further the robustness of the researcher interpretations (Baxter, 2014). As is seen in Chapter 3, the Ontario and Manitoba case sites offer additional capacity to understanding and theorize adaptation governance and strengthen the conclusions drawn through multiple data sets (Stewart, 2012). Purposeful sampling has also been recognized as a means to enhance transferability by assuring that respondents have experiences likely to be shared by their professional

counter-parts in other cases (Baxter & Eyles, 1997). Finally, transferability can be addressed during analysis and writing through rich description of research context and interpretive processes; as is provided in this chapter and throughout the thesis.

Dependability and confirmability were both addressed respectively through a variety of means. Dependability, the reduction, or transparency, of researcher bias in interpretation (Baxter & Eyles, 1997), was addressed throughout the research process through rigorous control of the research data via digital recording and repeated listening and close-readings of verbatim transcripts. While research notes were made during interviews, recording and verbatim transcripts allowed the researcher to assure that that respondent's words were not misinterpreted in the notes. Further, interview recordings were manually transcribed by the researcher, allowing for no inconsistency in transcription and for stronger familiarity with the data. In describing the key themes of the interview and workshop data, 'low-inference' descriptors were emphasized to highlight the interpretive nature of the qualitative research design and avoid assuming 'capture' of respondents' perspectives (Baxter & Eyles, 1997). Further, workshop data was co-analyzed with peers and advisors, who were also present in facilitating the workshops, and interpretations and meanings were member-checked with workshop participants for commentary and included in the resulting policy report produced (Bednar et al., 2018). The alignment with themes in key documents and workshop participants further assured that researcher bias was not a leading determinant in interpretation of the interview data.

Finally, to address confirmability it is vital to be transparent about the power dynamics involved in the research process, (Ward & Jones, 1999; Duke, 2012). It is therefore useful to reflect on the researcher's self-identified positionality during the interviews. The researcher, a white male from a low-income background, dressed casual for all interviews, typically in jeans and a plain t-shirt, or dress pants and a collared shirt. The interviews were carried out in a cordial and professional manner with respondent comfort prioritized. Other than base research questions for each theme, the researcher used generic cues for clarification and elaboration (e.g. "could you expand on that") (Miller & Crabtree, 2004).

All interviews were recorded with full knowledge and consent of the respondents. Further, respondents were assured of their anonymity in the reporting process.

1.4 Conclusion

1.4.1 Overview of Contents

This chapter has outlined the relevant literature which led to this thesis, as well as its design and methodology. The subsequent chapters operationalize the theoretical governance framework for climate change adaptation (Chapter 2) and present the findings of the methods to address Research Question 2 (Chapter 3) and Research Question 3 (Chapter 4). The thesis concludes with a short summary chapter that includes: discussion of project limitations, policy recommendations, and directions for future research on adaptation governance in Canada and globally.

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Chapter 2

2 Applying a Typology of Governance Modes to Climate Change Adaptation

Abstract: Climate change adaptation is a complex field of public policy that requires action by multiple levels of government, the private sector, and civil society. In recent years, increasing scholarly attention has been focused on the governance of adaptation, which has included exploring alternative models of decision-making and identifying appropriate roles and responsibilities of multiple actors to achieve desired outcomes. Scholars have called for greater clarity in distinguishing between different approaches to adaptation governance. Drawing on the rich scholarship on public governance, this paper articulates, and applies, a typology of four modes of governance by which adaptation takes place (hierarchy, market, network, and community). Using examples of initiatives from across Canada, the paper offers a framework for describing, comparing, and evaluating the governance of adaptation initiatives.

2.1 Introduction

Climate change adaptation is a complex policy area that requires *"effective and simultaneous management and coordination of both top-down and bottom-up approaches"* (Dickenson & Burton, 2011, p. 103). Summarizing the state of adaptation planning and implementation in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Mimura et al. (2014, p. 873) wrote:

> *As adaptation activities progress, many challenges have emerged, such as how to manage the decision-making process, how to develop strategies and plans, and how to implement them. In this regard, the roles within multilevel governance become an issue, such as horizontal coordination among different agencies and departments, and vertical coordination of various stakeholders from regional, national, to local actors.*

These vertical and horizontal coordination challenges have sparked growing interest in "adaptation governance", defined here as the patterns of coordination among actors, including the direction of authority and the dominant instruments used to achieve objectives.

Recent research has analyzed the coordination of adaptation initiatives that emerge in a top-down (i.e., state-directed) and bottom-up (i.e., locally mobilized) fashion (Bauer & Steurer, 2014; Wellstead, Howlett, Nair, & Rayner, 2016), explored the process of problem definition and timing (Huitema et al., 2016), and analyzed policy instruments and instrument selection (Henstra, 2016; Mees et al., 2014). Through this and other work adaptation governance scholars have sought to make sense of a complex environment involving multiple levels of government, fragmented resources, and responsibilities among public, private, and civil society actors. Mapping out a research agenda on adaptation governance, Huitema et al. (2016, p. 13) concluded:

> *'governors' in the climate adaptation domain need to define the problems they face, choose at what jurisdictional level action will be undertaken, decide when action will be taken, and through which modes of governance and instruments.*

It is clear that the configuration of actors, and their roles, in adaptation initiatives must be made clear in order for analysts to describe, compare, and critique governance arrangements. Currently, much of the existing scholarly literature on adaptation assumes that the process is, or should be, governed through complex networks of interdependent actors. As the typology presented here demonstrates, however, polycentricity and equality of input between state and non-state actors is only one idealized vision of adaptation governance. Networks, like all modes of governance, have considerable limitations, so considering the characteristics and dynamics of other modes of governance is useful to identify alternative governance arrangements. In this sense, governance analysis must allow for "closing off" of distinct visions in order for analysis and comparison to alternatives to be viable. To paraphrase Thompson (2003), for governance to mean anything, it cannot mean everything. When analyzing adaptation governance, therefore,

scholars could benefit from a typology that describes and differentiates between multiple modes of governance through classification.

In this paper we argue that the study of adaptation governance can be assisted by drawing on the broader theoretical and conceptual exercises that have defined the field of public governance. Topics such as whether complex societal problems ought to be approached from the bottom-up or the top-down, the nature of actor networks, the choice of policy instruments, directions of authority, and the deliberative process behind policy choices, have been the purview of governance scholars for decades. We propose that a typology of governance modes, which focuses on distinguishing actor roles, instrument selection, and direction of authority into ideal types holds value in making sense of adaptation governance for descriptive, comparative, and critical purposes.

The typology dates to Weberian analysis of state bureaucracies, and it has been further refined by many scholars (e.g., Bevir, 2012; Frances, Levacic, Mitchell, & Thompson, 1991; Hall, 2011; Meuleman, 2008; Powell, 1991; Tenbensel, 2005; Thompson, 2003). Each mode of governance within the typology embodies a distinct view of societal coordination via the role of the state and other actors. While it is far from novel, it has been fruitfully applied to other complex policy domains such as policing (Fleming & Rhodes, 2005), waste (Bulkeley, Watson, & Hudson, 2007), and tourism (Hall, 2011) and water management (Pahl-Wostl, 2015).

Typologies provide researchers with conceptual clarity and allow “the identification of discrete areas of politics, each area characterized by its own political structure, policy process, elites and group relations, power structures, and policymaking processes that differ according to the type of issue they deal with” (Hall, 2011, p. 442). Each mode of governance comprises an internal logic regarding state roles and acceptable instruments, so a mode’s explicit recognition allows for better contextualization of adaptation initiatives for comparison and critique. For the adaptation scholar, once a mode of governance has been identified, the typology, and the rich scholarship on which it is based, offers valuable empirical and theoretical literature to draw upon.

Crucially, the typology also reveals key normative assumptions behind distinct preferences for adaptation governance, as the four modes of governance rely on philosophical visions of state roles, policy instruments, and use of authority (Dixon & Dogan, 2002). By elucidating the internal logics of each mode, the typology highlights the very political process of designing, steering, or allowing for adaptation governance, thereby contributing to the 'opening up of the black box of governance' that has characterized much of the adaptation research to date (Biesbroek et al., 2015; Wellstead, Howlett, & Rayner, 2013). Through their competing visions of acceptable social coordination, the rivalrous ideal governance modes represent discrete visions that when applied to a policy problem better facilitate the discussion of how an issue ought to be governed (Meuleman, 2008).

The next section begins by describing the four modes of governance, including their underlying logic, unique features, and strengths and weaknesses. It then applies these governance modes to climate change adaptation initiatives in Canada though review of public documents. By identifying four distinct approaches to extreme rainfall and sectoral adaptation initiatives we demonstrate how the typology can be used to describe, compare, and critique adaptation governance arrangements.

2.2 A Typology of Governance

At the core of any mode of governance is the fundamental role of the state (Pierre, 2000), so the typology uses the relationship between actors and instruments to the state as a key metric of classification, recognizing that the state always maintains its monopoly on the use of force. This view is generally applied to all public governance typologies, many of which are variations of the original hierarchy, market, and network approaches (e.g., Steurer 2013; Trieb, Bahr & Falkner, 2007).

Before presenting the typology, a few clarifying points are in order. First, limits of such a typology are acknowledged. As Frances et al. (1991, p. 6) point out, the modes *"do not attempt to explain everything in one grand intellectual sweep."* They work instead to highlight different visions, values, and explicit expectations of governance. The typology

presented below outlines the governance modes as ideal types, whereas in practice elements from more than one is typically present, and this "mixing" is often the source of both effective governance and failure (Rhodes, 1997).

Nonetheless, the distinction between ideal modes is significant enough that differences should matter to the policy scholar. It will be impossible to identify, or promote, effective adaptation governance strategies without an adequate means of distinguishing their forms, internal logics, and potential for conflict. As Tenbensel (2005, p. 277) put it:

> *these ideal types can then be used as heuristic devices for gaining a handle on the complexity of actual public management practices, which involve combinations and layering of different modes*.

Second, the modes of governance outlined below may not capture the entirety of options for social coordination. However, after examining the combinations and sub-genres of each category, Meuleman (2008, p. 20-21), writing before the introduction of the fourth mode (community governance) to the typology, concluded:

> *…the use of the three ideal-types hierarchy, network, and market, provided that they are not presented as monolithic constructs but as sets of related characteristics with a distinct internal logic, can provide a basic analytical tool for understanding governance. The concepts of hierarchical, network, and market governance together offer a complete enough analytical framework for explaining the conflicts and synergies within and between governance approaches.*

The identification of governance modes can vary not only in identifying "mixes" of these modes (as mentioned above and described in a few cases below), but also in shifts over time. Many adaptation initiatives emerge from the typical policy cycle (problem identification, deliberation, implementation, monitoring) and therefore might embody different governance modes throughout the process. In this paper we focus on initiatives that have been carried out and are recognizable in public presentation. Nonetheless, it is recognized that governance entails both structure (institutions and actor and relations) as

well as process (rules and implementation) (Börzel & Risse, 2010). Here we focus largely on the latter through publicly available documents, which sometimes do not explicitly reveal full details regarding both structure and processes. The more detailed information an analyst can obtain regarding an adaptation initiative the more confidently the mode of governance can be described and critiqued across all stages of the policy or adaptation cycle. The four ideal modes of governance are described below.

2.2.1 Hierarchical Governance

Hierarchical governance involves nested levels of state authority, wherein each unit is subordinate to its vertical superior, and in which tasks are divided into more manageable forms (Bevir, 2012). In the realm of public governance, hierarchies involve a chain of command from elected officials, who set out strategic objectives which public servants then implement through state activities. Hierarchy is said to be a rational, effective model of organization, designed for clear purposes, with almost militaristic focus (Meuleman, 2008).

The primary actors in hierarchical governance are state officials and those with whom the state wishes to consult. The role of state organizations is determined by their place within the hierarchy, wherein authority moves from top to bottom. Non-state actors may be information providers but are “passive rule-takers” (Hall, 2011, p. 445). Dominant policy instruments are those typically associated with “command and control”, including laws, regulations, permits, and state intervention into individual liberties (e.g., eminent domain). Elected officials and senior bureaucrats determine policy needs and set the agenda, while those in the lower ranks implement the decisions.

Although it is fashionable to present hierarchy as antiquated, there remain clear instances of hierarchical governance in modern democracies (Bevir, 2012). For instance, policy fields related to security, law enforcement, and public safety tend to have a strong hierarchical structure. As with all governance modes, this reflects what society deems is an appropriate (i.e., politically acceptable) means of coordinating social life.

Hierarchical governance has a number of strengths. First, it effectively secures democratic legitimacy via representation, in that power flows from those with an electoral mandate from voters. Second, hierarchical control deals effectively with complex tasks (like adaptation) by sub-dividing them and encouraging the development of expertise. On the other hand, hierarchy is inflexible, has difficulty addressing policy areas lacking a clear consensus about desired outcomes and, in some cases, can stifle innovation due to a lack of broader societal inputs (Dixon & Dogan, 2002). Given the internal logic of hierarchical governance, the selection of policy instruments does not necessarily require input from producers or consumers, as requisite information is known, or developed, by the state. At stake in hierarchical governance is democratic responsiveness: if state mechanisms choose to ignore public input, they will exercise state authority with unmatched resistance, as is the case in authoritarian regimes.

2.2.2 Market Governance

The driving logic behind market modes of governance is that responses to complex issues are best coordinated through the "invisible hand of the market" or to a lesser extent, the use of market-driven behavioral change. Although markets rely on the state to protect property rights and legitimate currency, authority is dispersed amongst the individuals taking part in a transaction, meaning all market participants hold some influence over its direction.

Steering in this mode is therefore not top-down from government, but the result of competition and negotiation among market actors. Competition and negotiation is determined by the nature of the markets, and the extent to which states intervene or are more "laissez-faire" (Thompson, 2003). In more interventionist versions of market governance, state instruments such as taxes, subsidies, and rebates, loans and other state economic instruments are used to steer market participants. In others, there is considerably less state involvement and governance is marked primarily by the processes of supply and demand. However, both forms of market governance can be distinguished from hierarchy because market principles shape interactions between actors and are the locus of authority

in governing. Beyond basic rules set by the state to facilitate market mechanisms, consumers and producers (including governments) interact and negotiate the nature of the policy tools and determine market outcomes. The main actors of market modes of governance are market participants, and the state can be a participant, rule maker, or hands-off observer (Hall, 2011).

The key strength of market governance is that both "policy makers" and "policy takers" are empowered to influence policy decisions by their actions in the marketplace. This approach is said to be reflexive and responsive to changes in society, and reflects market ideals of individual choice (Marshall, 1991), especially in its more laissez-faire form (Thompson, 2003). The main limitation of the market mode of governance stems from the broader failure of market mechanisms to account for negative externalities (Levacic, 1991). Even in the more interventionist market modes, which are intended to reduce negative externalities, there is a risk of market failure. Furthermore, market governance is typically deemed inappropriate for coordinating services that are rights-based.

2.2.3 Network Governance

Networks were recognized towards the end of the twentieth century as a "third way" of governing and have been a significant focus of the governance literature since the 1980s (Bevir, 2012). In distinguishing networks from markets and hierarchies as a means of coordinating social order, Frances et al. (1991, 15) explained:

> *If it is price competition that is the central coordinating mechanism of the market and administrative orders that of hierarchy, then it is trust and cooperation that centrally articulates networks.*

Along with cooperation and trust, a central component of networks (or so-called 'new modes of governance') is the plurality of inputs. In this sense, the governance of issues benefits from the increased involvement of stakeholder groups, non-governmental organizations, and firms beyond those who are self-interested (as is characteristic of market

governance). Authority is then dispersed, flattened, and horizontal, and negotiated where appropriate for the benefit of all network actors.

As in market governance, in networks the state is one actor among many, but with significant authority and legitimacy to set the rules of the network, which is sometimes called "metagovernance" (Jessop, 2004). However, the extent to which the state is present to steer can vary, and thus so can the form of networks (Börzel & Risse, 2010). Typical policy instruments such as self-regulation, accreditation schemes, and codes of practice carry the distinct component of "trust" that is not necessarily found in hierarchical and market instruments (Hall 2011). Network governance relies on an internal logic of shared concerns and interests, as well as a willingness to cooperate. Equality of participants is seen as an ideal, with the assumption that each participant brings to the table some resources to address the issue.

Networks have several strengths as a mode of governance. They are more participatory, flexible, and can foster innovation to address difficult policy problems through the inclusion of a broader range of actors and novel ideas (Bevir, 2012; Provan & Milward, 2001; Whelan, 2015). According to Rhodes (2000, p. 81), networks work best when *"cross-sector, multi-agency co-operation and production is required" and "flexibility to meet localized, varied service demands as needed".* As such, network approaches have been embraced as a possible solution to the cross-sectoral problems of adaptation (Baird, Plummer, & Bodin, 2016).

However, network governance has significant limitations. First, the decentering of the state can threaten the democratic legitimacy of public policy, in that elected officials are no longer dominant, while those without a public mandate are empowered (Considine & Afzal, 2011). In such a case, the network becomes a tool of powerful network players able to steer not only other actors, but the state as well, to desirable policy outcomes (Börzel, 2011). Second, decentering the state limits the typical outcomes of networks to non-coercive tools, such as best practices and recommendations. Third, the flexibility of networks—the ability to take almost any form and include almost any actor—is sometimes

considered a weakness of networks as much as a strength (Frances et al., 1991). Finally, networks are often elitist and unrepresentative due to their reliance on expert communicators and those with resources to bring to the network (Rhodes, 2000).

2.2.4 Community Governance

The notion of community governance was first proposed by Pierre and Peters (2000). Tenbensel (2005) explained that community governance embraces many of the same consensual and participatory ideals of network governance but steering rests at the local level. In some instances, influence might be pressed upwards in order to acquire resources for locally developed, but otherwise autonomous, policies (Hall, 2011). Tenbensel (2005, p. 279) defined the key aspects of the mode as follows:

> *The emphasis is on a community of self-governance and the normative literature on this type of governance is closely connected to long-standing themes of subsidiarity and local control over localized problems.*

Community governance essentially reverses the roles found in hierarchical governance, whereby community members and local governments develop policy. Within federations, higher level governments may then be "policy takers" who provide resources for local communities to implement locally-derived plans. Given the core principles of unity and cooperation, typical instruments in the community governance mode include open public deliberation, education campaigns to inform local participants, direct democracy, and voluntary uptake via civic commitment (Hall, 2011).

The key strengths of community governance are its ability to foster outcomes that are appropriate and customized to the local scale, as well as its procedural equity. For many environmental, cultural, and social policy issues, local autonomy is seen as the only way to avoid problematic policies developed at higher levels that are inappropriate for local conditions (Hall, 2011). Procedural equity is achieved through open and transparent deliberation. The deliberative policy process in this mode is rooted in ideals of direct

democracy, the engagement of fellow community members, and fewer barriers to participation.

Community governance has limitations, however. Foremost, it is seen as idealist and expecting too much from local consensus (Hall, 2011). There is no doubt that the communicative rationale at the core of community governance is optimistic, and the ideal of local autonomy seems decreasingly possible in the 21st century globalized world. Community governance may also suffer from the same imbalance of power as networks, providing the opportunity for limited interests within communities to steer governance towards certain issues and visions. Further, the community mode of governance challenges fundamental constitutional structures in multilevel political systems, such as federations. As Nederhand, Bekkers & Voorberg (2016) point out, community governance conceptualized as entirely distinct from the existing hierarchical 'shadow of hierarchy' remains a challenge given the presence of structural relationships between communities and higher orders of governance. If community governance is truly autonomous from higher-level authorities, then there will be obvious limitations to what it can accomplish due to limited local resources. Thus, it is sometimes unclear as to how local actors intersect with state structures in community governance modes. However, what community governance chiefly provides to the typology is the capacity to conceptualize localized or upward-moving authority that is otherwise missing in the downward, circular, or flat directions of the other modes. The typology of ideal governance modes is presented in Table 2.1.

Table 2.1 - Four mode typology of governance and key features

	Hierarchy	Market	Network	Community
Direction of Authority	Top-down	Circular (supply and demand)	Horizontal	Bottom-up
Initiating and Implementing Actors	Federal, regional and local governments	Government and market actors	Government, private sector, and non-governmental experts	Citizens, community groups, and neighbourhood associations
Dominant Policy Instruments	Legislation; Regulation	Supply and demand; Government market intervention	Negotiated agreements; Codes of practice; Voluntary programs	Self-regulation; Voluntary participation

This section has identified and explained four ideal-type modes of governance drawn from existing scholarship, each of which embodies a distinct vision of societal coordination, including the role of the state and appropriate policy instruments. The next section applies the governance modes to the policy field of climate change adaptation, offering a framework to analyze and evaluate adaptation governance across different impacts, sectors, and locations.

2.3 Governance Modes and Climate Change Adaptation

Scholars use different frames to analyze adaptation governance (Dewulf, 2013). Some frame adaptation as a response to climate change impacts, with research exploring how actors can prepare for, or are adapting to, climate-related hazards such as heatwaves (Wolf, Adger, Lorenzoni, Abrahamson & Raine, 2010) or urban flooding (Oulahen, Mortsch, Tang, & Harford, 2015). A second framing of adaptation focuses on sectors, exploring efforts to adapt practices within specific sectors, such as agriculture (Bryant et al., 2000), conservation (Brooke, 2008), and water (Miller & Belton, 2014). This section outlines how the typology of governance modes presented above can be used to analyze adaptation efforts focused on both particular impacts and within different sectors.

The primary means of identifying the dominant mode of governance around an adaptation initiative is through the key actors, their relations, and associated policy instruments. The more familiar an analyst is with a case the more accurately they will be able to discern the nuanced mixes of the modes involved throughout the entire adaptation process. Here we use document analysis to identify examples of each governance mode in response to the same impact or across different sectors. While our cases of adaptation initiatives are selected form the federal state of Canada, the typology holds value for any constitutional state with identifiable orders of government, a distinct private sector, and free associating public and non-governmental actors.

2.3.1 Adaptation Governance and Climate Change Impacts: Extreme Precipitation

Hierarchical governance is a feasible means to coordinate adaptation across sectors and scales when a government has authority to command the behavior of societal actors or other governments. In the case of the City of Toronto, a municipal bylaw was passed requiring homeowners and businesses to disconnect downspouts from the city's stormwater sewer system. The program began as a voluntary initiative in 1998 but was amended to a requirement in 2007 due to increased risks of urban flooding (City of Toronto, 2018). The policy is enforced through fines for non-compliance and is monitored by city by-law officials. The downspout disconnection program is a clear example of state authority exercised to deal immediately with a risk to infrastructure with relative certainty in outcome. The policy was developed in response to instances of basement flooding, and increased costs to the city through the early 2000s (City of Toronto, 2007a).

Reports show that city officials recognized the voluntary initiatives were insufficient even after considerable effort had been invested in door-to-door awareness building campaigns (City of Toronto, 2007a). Community input was facilitated through the awareness-building campaign, but a decision was eventually made to pursue a mandatory disconnection program after analysis of cost to the city and residents as estimated internally by Water Toronto (City of Toronto, 2007a). In this case, the state, the City of Toronto identified a

problem, developed a solution internally within its jurisdictional capacity, and employed a coercive policy instrument with predictable and measurable outcomes. The downspout disconnection program is clear example of hierarchical governance in response to climate change where the implementing actor is the state, the policy tool is regulatory, and authority moves downward.

Market-based governance responses to adaptation are reflected in state intervention in market processes via programs to incentivize or disincentivize action rather than mandate it, while actual responses and implementation are left to consumers and producers. For example, responding to climate change-induced extreme rainfall, the City of Toronto initiated a Basement Flooding Protection Subsidy Program, which provides public funds to incentivize the installation of a backwater valve for basements that are connected to the city stormwater system (City of Toronto, 2017a). Similarly, the City of Mississauga's stormwater charge combats increased urban rainfall by levying a fee on each property based on its impermeable surface area (City of Mississauga, 2017). In these examples, the state employed a market-based tool to incentivize adaptation among property owners (i.e., reducing stormwater discharge), and implementing actors are market participants. While the City of Mississauga's approach was largely state-driven, the choice of a taxation policy instrument relies on the internal logic of market governance to incentivize rather than to coerce.

In both cases, recognition of the need for an adaptive measure to reduce overland flow emerged from instances of flooding in the Greater Toronto Area. In the Mississauga case, the approach was taken to influence citizen behavior and accrue funds for infrastructure improvements, and the taxation (seen as a user fee) was preferred over an increase in property tax to raise the same funds (City of Mississauga, 2012). The program was developed in a traditional policy sense, whereby state directed public engagement sought feedback, but where the agenda was not co-produced with other participants (AECOM, 2013). The city did not aim to intervene in property development or land use design directly

(or hierarchically), so officials preferred to use the tax to incetivize market actors toward the use of permeable surfaces as a means to manage climate risk.

Network governance has commonly been promoted to address complex problems like climate change adaptation (Baird et al., 2016), and as a result has been popular in Canada with the provincial and federal orders of government. Much of the adaptation policy development witnessed in Canada and other states has emerged from intentionally designed networks of actors (Huitema et al., 2016). Between 2007 and 2011 the Government of Canada operationalized six Regional Adaptation Collaboratives with a clear network logic of convening actors and sharing information around climate risks and possible adaptation responses (Henstra, 2017). Although the federal and provincial governments played a meta-governance role in developing the network, there was no intentional hierarchical structure, and neither regulatory nor market instruments were deployed or discussed at much length in RAC outputs.

One of the RACs provides an example of a network approach to adaptation for extreme rainfall. The Prairie Regional Adaptation Collaborative (PRAC) was a group of government and non-government partners jointly funded by the Governments of Canada, Alberta, Manitoba, and Saskatchewan to:

> *Increase the capacity of municipal decisions makers to integrate climate adaptation into local planning decisions…by providing decision-makers with regionally relevant policies, networks, knowledge, and tools* (Parry, Taylor, Echeverria, McCandless, & Gass, 2012, p. 1).

A review of PRAC's work on stormwater reveals that outputs were entirely information-based and persuasive tools were chosen to implement objectives, such as a voluntary resilience assessment framework for municipalities (Parry et al., 2012). In this case, a network of interdependent actors developed non-coercive, information-driven, initiatives to address climate change, consistent with the logic of network governance (Hall, 2011).

Finally, community governance is observed where actions are not driven by upper-level state structures, nor market forces or complex networks of cross-sectoral actors, but rather by place-based voluntary commitments (Hall, 2011). In the case of extreme rainfall, community governance is evidenced in low-cost, “grassroots” instruments that require no official sanction from a higher-level authority. Such initiatives include public awareness campaigns to promote permeable driveways, increased greenspace, aid during extreme events, and property-level measures to capture and store stormwater (e.g., rain barrels). Such activities are evidenced in the work of Community Resilience to Extreme Weather (CREW), a grassroots organization in the Greater Toronto Area, which trains local volunteers to help vulnerable neighbours in the event of extreme temperatures, floods, and storms (CREW, 2017).

Other initiatives of CREW include awareness building and vulnerability mapping. CREW’s organizational mandate makes direct reference to “faith and the common good”, reflecting Jessop’s (2011) vision of community governance as motivated by personal relationships and civic values. The CREW community group relies on activity without the coercion of the state, or even state presence, and actors are not predominantly driven by market forces (CREW, 2017). While CREW has engaged local state structures for resources, it maintains a grassroots, upwards movement of authority through community identified priorities.

Table 2.2 - Governance modes and extreme rainfall responses

	Hierarchy	Market	Network	Community
Action	Mandated downspout disconnection	User fee (tax) for non-permeable surfaces	Partnership building and voluntary best practices	Neighbourhood awareness and volunteer extreme weather event response
Example	Toronto Mandatory Downspout Disconnection Program	Mississauga Stormwater Charge Program	Prairie Regional Adaptation Collaborative: Drought and Excessive Moisture Theme	CREW Toronto Extreme Weather Volunteers Program

2.3.2 Adaptation Governance and Policy Sectors

A key component of hierarchical governance logic is that problems and desired goals must be articulated with relative certainty in order to legitimate command-and-control policy approaches (Hall, 2011). This means that some sectors, such as buildings and infrastructure, are more conducive to hierarchical adaptation governance than others, because they lend themselves more readily to quantification. In identifying hierarchical adaptation governance in a particular sector, an example can be found in Toronto's Green Standard program, adopted in 2010, which imposes on builders *"a set of mandatory performance targets for the design and construction of new developments"* (City of Toronto, 2017b). Authority flows down from the state to the building sector, members of which must implement the new requirements, which are enforced through a permitting system (City of Toronto, 2017c). When the City of Toronto experienced an extreme rainfall event in 2013, the Green Standard program was adjusted to focus more on managing stormwater runoff for different categories of development (internal corporate, low-rise and residential, and mid to high-rise) (City of Toronto, 2017b). The planning processes which must account for stormwater runoff are enforced through issuance of permits for construction which need to consider effective calculation of averted impact. The Green Standard program is a clear intervention of state capacity into a sector in order to foster adaptation, and it relies on an enforceable, coercive, policy instrument to do so.

Agriculture can be said to be an inherently adaptive and market-driven sector, because its activities are heavily influenced by weather and climate, and practitioners have long recognized how to alter their behaviour based on climatic conditions in order to sustain their livelihoods. Some governments appear to harness this adaptability and market logic, as evidenced in the Government of Manitoba's use of incentives, compensation, and insurance programs as the dominant instruments of agricultural governance (Manitoba Agriculture Risk Management Task Force, 2015). These include the semi-private AgriInsurance, the federal AgriStability program, and the provincially operated AgriRecovery program. As a result, adaptation within the agricultural sector in Manitoba is driven mostly by government intervention into, or steering of, market behaviour and lack of regulatory command. The AgriInsurance program provides insurance to producers in Manitoba against "uncontrollable natural perils" such as drought, flood, fire, and other hazards (MASC, 2018). The program uses the economic instrument of publicly funded, privately managed, insurance to incentivize continued production of crops in the face of climate risks.

However, the program is not mandatory and relies on the market incentive of producers recognizing risk and potential loss. In this sense the authority to adapt remains with market participants, meaning state authority is not exerted unless one enters the market. The AgriInsurnace program is not a command intervention by the state, nor a network of negotiation between the state and producers, as the Manitoba and federal governments are offering the service independently of producer uptake. The AgriInsurance program does however reflect the mixing and shifting of modes as an initiative develops. The program's development emerged largely from public-private consultations in a more networked form (Manitoba Agricultural Risk Management Task Force, 2015), but the eventual initiative and policy instrument supporting it are decidedly market orientated.

Sectoral, network adaptation governance is evidenced prominently in the Government of Canada's Adaptation Platform, a virtual community of practice designed to convene stakeholders for adaptation policy development and implementation. The Platform

promotes partnership and dialogue, organized into nine specific working groups that have a sectoral lens (e.g., energy, infrastructure, and mining). Based on the outcomes of the Platform published in 2016, a majority of the projects have generated either 'best practices' or 'state of knowledge' documents, such as vulnerability assessments and literature reviews (Natural Resources Canada, 2016). Numerous projects engage large numbers of partners, and many are led by 'boundary organizations' such as the Pacific Climate Impacts Consortium (PCIC), which bring together public, private, and civil society actors as equal partners. The key initiating actors of such networked processes vary, including government officials, major NGOs, and industry associations. A review of all outcomes regularly published by Natural Resources Canada shows that aside from the state's role as convener, there are is no focus on coercive state intervention. Within the adaptation platform, information development is paramount, sharing information around impacts and vulnerabilities and industry best practices for self-regulation are the dominant outcomes of the Adaptation working groups as a providing non-binding guidance documents for local governments (Natural Resources Canada, 2016).

Finally, community governance with a sectoral lens may evolve to address climate change vulnerabilities recognized at the smallest scales. In Winnipeg, Manitoba, for example, concern over climate impacts on the agricultural sector and food security amongst low-income residents have prompted local groups, such as Sustainable South Osbourne, to develop programs which foster urban resilience to climate-induced food disruption through community-run gardens (Sustainable South Osbourne, 2016). Consistent with community governance, the group looks to higher levels of government for resources rather than administration. A core principle of the organization is that the community knows best their environment and risks and they are the rightful stakeholders (Sustainable South Osbourne, 2016). In recent years the initiative has evolved to include academic partners under the name South Osbourne Permaculture Commons (SOPC). Despite relations with state, academic, and private actors, the initiative remains committed to community governance led by participants of the commons via direct democratic input (South Osbourne Commons, 2018).

In the SOPC, the chief instrument of action is awareness-building, particularly concerning the use of common property for food production in order to promote co-ownership and shared responsibility, as well as agricultural skills for future generations (Sustainable South Osbourne, 2016). The group distinctly emphasizes autonomy and independence to *"ensure democratic control by their members"* even when resources are supplied from external sources (Sustainable South Osbourne, 2016). Consistent with community governance, projects are developed through open and participatory deliberation and are implemented by members. Although the projects might encourage action in other communities or at the provincial level, they remain focused on the community scale and voluntary actions of citizens. Notably, coercive state instruments are not present, and Sustainable South Osbourne is driven by a collective sharing of authority through deliberation.

Table 2.3 - Modes of governance and adaptation in policy sectors

	Hierarchy	**Market**	**Network**	**Community**
Action	Mandatory construction standards	Subsidies, insurance and recovery funding	Best practices, state of knowledge reports, guidance documents	Autonomous community food production and skill development
Example	Toronto Green Standard	AgriInsurnace, AgriStability and AgriRecovery Programs in Manitoba	National Adaptation Platform Mining, Infrastructure and Energy Working Groups	Sustainable South Osbourne Permaculture Commons

2.4 Conclusions

2.4.1 Descriptive, Comparative, and Normative Value

Having shown the means by which analysts can identify adaptation modes of governance, it is important to again reflect on the value of such a typology. Adaptation researchers face multiple lenses through which to view the complex process of adaptation governance. The typology presented here provides discrete analytical categories in which to place the governance components of adaptation. By distinguishing among key actors and their roles,

policy instruments, and relational directions of authority, adaptation scholars have key indicators to identify the mode of governance at work in a particular sector or jurisdiction. In each case there are distinct modes of governance that can be referred to, and that are more manageable for analysis than the often-vague claims that adaptation is complex and multiactor. Evidently each mode is complex and multi-actor, but in different ways, and with different strengths, weaknesses, and ramifications.

Further, the typology allows for comparison of important details of adaptation processes to better assess their transferability across impacts, sectors, or locations, and to assess the relationship between the state of adaptation and the ongoing modes of governance. For example, an effective adaptation program that is produced largely through hierarchical governance cannot be easily transposed to a location in which elected officials are unwilling to act on climate change. Recreating an adaptation strategy includes more than copying instruments; it requires understanding actor roles and interactions that lead to policy instrument choices and a grasp of how the governance arrangements led to the adaptive measure. In both Toronto and Mississauga, for example, flooding due to intense rainfall was addressed by the state, but with distinct logics. Both cities faced a choice about which governance mode and policy instrument would best deal with the impacts of extreme precipitation, and either could have chosen regulation or taxation. Focusing on the operative mode of governance and the outcomes of adaptation initiatives could illuminate ways to replicate effective approaches across jurisdictions, sectors and scales. The typology then provides a framework for comparison of these complex processes.

Other comparisons using the typology may include consideration of scale. As indicated by our examples, modes of governance for the same impact vary not only by location, but by scale. Will most other city governments approach extreme rainfall with market tools? Will higher-level governments consistently promote network approaches? As adaptation initiatives proliferate, typologies like the one we have outlined here will be valuable for analysts to compare varying approaches to similar impacts and across sectors.

Finally, the typology allows for clear identification of the politics of adaptation governance. Modes of governance, and their implications for adaptation, are inherently related to visions of how society *ought* to be governed and are therefore highly normative (Dixon & Dogan 2002, Hall 2011). The typology provides a frame of reference to distinguish the values at the core of particular visions of governance. By advocating for one mode of adaptation governance over another, actors present a vision of how we should govern climate change adaptation and society. Recognizing this too will help bring adaptation out of the "black box" (Wellstead et al., 2013).

For instance, actors who promote the use of economic instruments (especially in the more laissez-faire version of market governance) reflect a belief that adaptation is not inherently a responsibility of the state, but an individual onus. Conversely, actors who promote the use of regulation or legislation are advancing ideals consistent with hierarchical governance: adaptation is a state responsibility and compliance is paramount, given the severity of the issue. These competing visions must be recognized in understanding the challenges of adaptation governance, which is clearly both a procedural and political problem. Any effort to replicate, or assess, adaptation initiatives cannot ignore these normative components.

2.4.2 Moving Forward

In embracing the governance typology grounded in an already rich field of public policy research, adaptation researchers may find value in explanations of why some modes of governance do not work well with particular problems, or why a certain mix of modes simply will not work at all (Rhodes, 1997). Combining aspects of different governance modes might be problematic because of competing internal logics of each mode's governance component. However, in their application of the typology to policing in the UK and Australia, Fleming and Rhodes (2005, p. 203) argued:

> *The future will not lie with either markets, or hierarchies or networks but all three. The trick will not be to manage contracts or steer networks but to mix the three systems effectively when they conflict with and undermined one another.*

Adding the community governance mode of typology, this future of mixing appears to be relevant to the field of adaptation. This mixing may ultimately be a role for governments, who are uniquely equipped with the authority, legitimacy, and resources to combine aspects of these governance modes.

Ultimately this study is limited and aims to act as an introduction of the typology to he adaptation research. Further work will need to better distinguish governance modes across specific sectors and impacts. The challenge today, as pointed out in this paper, is that many jurisdictions remain inactive on adaptation in particular sectors or as a whole. With an increase in the number of formal adaptation policies and programs, the value of the typology's application will grow. There needs to be consideration of the detailed parsing of adaptation by sector, scale, and impact for the fullest realization of the value of the typology of governance for descriptive, comparative, and critical purposes.

However, the added benefit of using a typology with such a long history is that the well-known strengths and weaknesses of the four modes can be considered when developing adaptation initiatives. It can be expected that the uncertainty surrounding many climate change impacts limits the utility of a hierarchical logic, and this uncertainty shifts expectations about policies, so the flexibility of networks may be necessary. However, the relative inefficiency of networks might make them insufficient to achieve the transformation required of major public infrastructure and economic behaviour in order to reduce vulnerability (Lonsdale, Pringle & Turner, 2015), so markets or hierarchy may be required. Finally, adaptation will not occur outside the contexts of community histories, geography, and values, so efforts must be developed while cognizant of even the smallest scales. Suffice to say, recognizing the strengths and weaknesses that each mode embodies is a critical first step.

Ultimately, we hope that engagement with the typology, the internal logics of actor roles and appropriate policy instruments leads to increased conceptual clarity in the analysis of the governance of climate change adaptation, but also the politics of the governance of climate change. This paper responds to the critique made by various scholars that adaptation governance is too often discussed with reference to structural functionalism and a "black boxing" of the political nature of governance (Wellstead et al., 2013; Biesbroek et al., 2015; Eriksen et al., 2015). We hope that in applying a well-developed typology of governance, the field can mature to better interrogate the processes, outcomes, and competing philosophies of actor roles, relations, institutions, and policy instruments in climate change adaptation.

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Chapter 3

3 Is Network Failure to Blame for the Implementation Deficit?

Abstract: Although governance issues are often evoked as a challenge for implementing effective climate change adaptation, notions and problems of governance have scantly been directly analysed in the literature. It has been recognized that much adaptation governance literature limitedly characterizes governance as it avoids comparing competing governance modes. This paper conducts a meso-scale analysis of governance issues surrounding climate change adaptation through the review of existing actor roles, actor relations, and policy instruments in Canada to illustrate the current governance of climate change adaptation. Through review of adaptation documents and in-depth interviews with practitioners from all three orders of government and non-governmental practitioners, we find that a prevailing logic of network governance dominates adaptation in Canada, especially at provincial and federal scales. We argue that such explicit, empirical, and theoretically informed characterization of adaptation governance is lacking and aim to show how it can benefit adaptation practitioners via review of the known strengths and limitations of competing governance modes. In our case, we argue that the ongoing challenge of adaptation implementation in Canada is consistent with the concept of network failure (or the limitations of network governance). With insights from the broader governance literature we submit that network dominance in adaptation policy must be challenged, reordered, and more effectively steered, though not abandoned entirely.

3.1 Introduction

Climate change adaptation is defined as the process of reducing vulnerability to climate change and preparing for its impacts (Noble et al., 2014). It is conceptualized here as a five-stage cycle of: (1) hazard identification, (2) risk and vulnerability assessment, (3) choosing adaptation measures and policy instruments, (4) implementation, and (5) monitoring and assessment (ICLEI, 2012). Over the past decades it has been consistently stated that the challenge of preparing for the impacts of climate change is a complex,

multifaceted, problem which requires the participation and coordination of various key actors (Noble et al., 2014). Specifically, these 'governance issues' have been considered as central to the ongoing challenges of unequal adaptation, maladaptation, and, above all, implementation deficit in adaptive practice in which most jurisdictions are continually stuck in stages 1 through 3 (Dupuis & Knoepful, 2013; Mimura et al., 2014). As such, adaptation research has turned to governance literature as a means of better understanding and discussing the multi-actor arrangements that structure adaptive efforts (Huitema et al., 2016).

However, the governance of climate change adaptation remains in need of clearer conceptualization in empirical research (Wellstead et al., 2013; Hong Phuong, Biesbroek, & Wals, 2018). Descriptions of how adaptation is currently being governed with reference to competing potentials are limited and in most case-study analysis of specific programs, governance has been problematized as an external variable, rather than a series of identifiable options for actor relations and policy instruments open to intervention (Wellstead et al., 2013). This focus on micro-scale idiosyncrasies of individual projects has then often shifted to macro-scale discussion (grander theoretical considerations) of adaptation without consideration of mesoscale (second order) processes of governance arrangements (Kooiman, 2003). As Wellstead et al. (2013, 3) have argued, in most research on adaptation, "the analysis jumps quickly and uneasily between high-level abstraction and microlevel policy recommendations and skips over the missing middle of governance variables".

Based on these concerns, this paper undertakes a robust characterization of key governance features surrounding climate change adaptation in a multilevel system. Using an explicit typology for identifying and contrasting competing modes of governance (missing middle) we identify the current mode of governance in Canada, a western democratic country with multiple orders of overlapping government scales. This classification is done through identification of key features. Key governance features are defined here as actor roles, actor relations, and policy instruments, as demarcated in an established governance typology

(Hall, 2011; Pahl-Wostl 2015). Approaching adaptation with respect to multiple, competing, visions of governance is necessary as few studies describe existing governance with reference to a wider breadth of potential arrangements. This gap in the literature limits the conceptualization of intervention options and does not adequately constraint existing adaptation processes for critique, as there is nothing to compare them to. Further, the lack of robust characterization around adaptation has reduced the potential impact of the broader governance literature in providing insights for intervening in the face of adaptation's implementation deficit and related challenges.

The goal of the study was then to robustly characterize ongoing adaptation governance at a more-than micro scale by using a theoretically informed framework of multiple governing modes and primary data from multiple case studies in a western democratic country. The robust, and theoretically informed, governance characterizing, or diagnosis, allows for connection between the current state of adaptation in many western democratic states and the known strengths and limitations of any identified governance modes and their alternatives. Through review of key documents and interviews with 81 adaptation practitioners across Canada, we identify the dominance of network governance and, consistent with other adaptation research, confirm the relative stagnation of adaptation at the pre-implementation stage. Based on these two findings, and the known limitations of network governance, we discuss reconsideration of the value of network governance for climate change adaptation and pathways forward.

3.2 Literature Review

3.2.1 The Adaptation Implementation Deficit

The notion of deficits in adaptation have been discussed since Burton (2006, 34) who identified that "we are not as well adapted as we should be, and that there is currently an adaptation deficit". As adaptation research and practice has progressed over the past decade the deficit could be said to have moved along the stages of adaptation. As governments, industry, and researchers have addressed impacts, risk assessment, and deliberation, the adaptation deficit is now seen more pronounced at the implementation stage (Biesbroek et

al., 2010; Dupuis & Biesbroek 2013; Dupuis & Knoepfel 2013). The implementation deficit then specifically refers to the disconnect between the amount of activity in impact identification and risk assessment contrasted with the lack of concrete adaptive actions.

Implementation is defined here as the operationalizing of a policy instrument (regulatory market or persuasive) paired with an adaptive measure promoted by the state or "the set of processes after the programing phase that are aimed at the concrete realisation of the objectives of a public policy" (Knoepfel et al., 2011; 196 as quoted in Dupuis & Knoepfel, 2013). In the most recent summary of adaptation progress for the Intergovernmental Panel on Climate Change, contributing authors Mimura et al. (2014) concluded that even at the global level:

> *There is still limited evidence of adaptation implementation. Implementation remains challenging because in the transition from planning to implementation the many interested parties must overcome resource, institutional, and capacity barriers.*

The notion of an implementation deficit has been identified at both global as well as national scales. Regarding national efforts in Canada, the Office of the Auditor General (2017) concluded that the Government of Canada, as a whole, was yet to be beyond much of the first two stages of the adaptation cycle. Of the five most active federal ministries recognised in the report, the Auditor General summarized the state of adaptation in the country as 'intensive research with limited implemented programs'. At the provincial scale, the same general trends emerged as a collaboration of provincial Auditors General found that only eight out of twelve reviewed provinces and territories had released adaptation strategies (Alberta, Manitoba, Northwest Territories, and Saskatchewan having no strategies), and, overall, they were lacking in implementation of adaptation-specific measures and policies. The collaborative report of the Auditors General of Canada, (2018, 16) concluded:

> *Many of the adaptation strategies outlined high-level commitments, but few had an implementation plan that spelled out the more manageable interim steps needed to reach these commitments.*

The lack of implementation of concrete strategies at all scales of government continues as a central challenge of modern adaptation research and has been identified both internationally and in Canada. Implementation as a component of the policy cycle is inherently related to governance arrangements (Rykkja et al., 2014), as will be discussed below, any understanding of the implementation deficit requires an understanding of ongoing governance arrangements.

3.2.2 Operationalizing a Typology of Governance

This paper examines adaptation governance through identification and comparison of competing modes of societal coordination by which public policy issues can be addressed (Hall, 2011). In this approach, different governance modes are conceptualized as arrangements based on observed relationships between actors involved in the public policy landscape, as well as the presence and use of certain policy instruments (Meuleman, 2008). Governance modes are typically categorized into four distinct types, each with their own strengths and weaknesses: hierarchy, market, network and community (Pierre & Peters 2000; Thompson 2003; Hall 2011; Bevir 2012: Pahl-Wostl 2015). Typologies offer a researcher the clarity and direction to study complex issues such as adaptation governance. As Hall (2011, 438) argued: *"typologies are used for both descriptive and explanatory purposes and can focus on variables related to causes, institutions and/or outcomes".* Our application of this typology also aims to address Wellstead et al.'s (2013) missing middle of governance in adaptation research, by directly querying identifiable components of social coordination. The typology of governance used in this study is described below.

In hierarchical governance, the state plays the primary role of regulator and addresses issues through command and control. In this mode, instruments rooted in legal authority of the state, such as regulations, codes, standards and legal requirements, are the dominant

tools of action and relations are characterized by ranks of authority in the policy arena (Thompson, 2003). Conversely, market governance relies on supply and demand principles to bring about action. Again, the state is a central actor (through legal protection of market principles and market rules) but implementation of policy goals is conducted by market actors as facilitated by state guidance and economic instruments (taxes, fees, incentives) (Kooiman, 2003). Market governance can also operate in a more laissez-faire manner, in which the state does not explicitly intervene via market instruments but leaves an issue to market processes. In either market scenario, actor relations are based on bartering within the established order (Bevir, 2009).

Networks are distinguished as policy arrangements in which actors rely on one another in order to access resources and identify shared policy goals (Thompson, 2003). Networks differ from markets as actor decisions are based on shared interests and voluntary commitment. In network governance of policy issues, network-members typically have little authority over other actors, therefore creating polyarchy (Bevir, 2009). Conceptually, networks are described as having "flat organizational form and equality of membership" where trust and cooperation are the defining relational characteristics of policy making and implementation (Thompson (2003, 40). Lastly, community governance includes devolved processes of decision making and implementation driven directly by local stakeholders/residents of a community though voluntary actions (Pierre & Petters 2000; Tenbensel 2005). Community governance is distinguished from other modes through its bottom-up structure of relational interaction, as well as its reliance on commitment to community as motivation to act (Tenbensel, 2005). Pierre and Peters (2000) suggest that community governance is most common in the context of policy issues where governments are seen as unnecessary or where formal government presence is limited (for example at neighbourhood and community scales).

Table 3.1 - The four modes of governance, their characteristics and policy instruments

	Hierarchies	Markets	Networks	Communities
Key Actors	State Actors	Market Participants	State, Private, NGO Actors	Residents
Key Actor Role	Command	Barter	Convene	Volunteer
Actor Relations	Subordination	Competition	Reciprocity	Commitment
Policy Instruments	Regulation and Legislation	Pricing and Incentivization	Self-Regulation and Best Practices	Information and Volunteering

Identifying the operative governance mode in a policy domain and location entails observing the roles of various actors, their relations to one another, and the presence or absence of policy instruments (Meuleman, 2008; Hall, 2011). The state choice of policy instruments is intrinsically tied to modes of governance based on the internal logic of each mode and is consistent with the philosophy of social coordination inherent to it. Policy instruments, like their modes of governance, address specific challenges uniquely, each with their own strengths and weaknesses, benefits and externalities, normative attachments, and costs and benefits for climate change adaptation (Henstra, 2015). Through this internal logic, the modes are also implicit theories about how an issue *ought* to be governed, providing a clear normative component to the typology's four modes (Hall, 2011).

We apply the governance typology as both a descriptive tool for characterizing the dominant mode of adaptation governance, as well as an analytical framework to highlight existing strengths and limitations given the breadth of literature related to the typology. While the framework has been referenced in some existing adaptation work (Mees et al., 2014; Bauer & Steurer, 2016; Hong Phuong 2018), it has not been employed systematically to analyze empirical cases. It should be noted, that the typology of governance described here presents governance modes as ideal types, but that often the governance of complex policy issues like climate change adaptation includes features of several modes in various mixes and at various scales (Rhodes, 1997, 2012).

Our goal was to identify the dominant mode of governance across multiple scales, recognizing that features of various modes always exist in various mixes, but that generally an overarching dominant mode exists (Hall 2011; Pahl-Wostl 2015). While mixes and specifies will certainly vary, only the ideal-types can conceptualize the board, cross-scale, processes at multiple orders we know to be necessary, and operating, around adaptation. As Rhodes (1997, 31) asserts, describing ongoing social processes using 'organizing perspectives' (governance modes) is interpretive as it is *"always partial…it never provides a comprehensive or even definitive account. It is a map and such maps can guide"*. Therefore, while a scholar could become lost searching for an account that allows for each idiosyncrasy of a governing order, they would necessarily forgo the explanatory capacity provided by the conceptual clarity of the typology.

3.2.3 Governance Limitations and Failure

The strengths and weakness of these modes are well established and explored in a wealth of governance literature (Kooiman 2003: Meuleman 2008; Bevir 2009; Pahl-Wostl 2015). Briefly speaking hierarchies are seen as too rigid and irresponsive, especially in the face of dynamic problems such as climate change. Market governance carries too many externalities and bring with it ethical limitations in effective distribution of goods. And network governance is hampered by the paralysis of plurality and a lack of means to invoke action. Finally, Community governance is limited in its reach and faces challenge of coordination as issues rise to wider social or geographical scales. As a result, when these features emerge they need to be addressed via components of competing modes to act as complements (Rhodes 1997; Borzel 2011). In the absence of the effective recognition of governance limitations as they emerge, or a hesitance to turn to competing arrangements, governance failure emerges.

Governance failure is defined as *"the perceived ineffectiveness of governance processes…interpreted by some as the crises of governability or the legitimisation crises"* (Dixon & Dogan. 2002), depending on the dominant mode of governance this scenario emerges as a number of features, including: lack of knowledge, lack of capacity and

instruments, lack of implementation and effectiveness, or lack of motivation and compliance. Which of, and how, these problems emerge for each mode of governance is unique to their internal logic and weaknesses. Hierarchies experience bureaucratic overload (red tape) and ineffective command instruments (cheating), markets experience externalities, market failures (inaccurate pricing), inefficient distribution and monopolies, among others. Network failure emerges as stagnation where policy 'success' is continually negotiated amidst relations in which responsibility is blurred. As Meuleman (2008, 50) plainly puts it, networks fail as they devolve into *"never ending talks, no decisions"* in which actors avoid drastic compromise and coercive relations. This scenario has led to the claim that networks, by design, only provide governments with so-called *"rubber levers"* (Rhodes, 1997, 41). Lastly, community failure, though largely unexplored in the literature, emerges as the scales of problems and their coordination overwhelm the resources of local governors (Pierre & Peters, 2000).

3.3 Design and Methods

To effectively characterize adaptation governance, a multilevel analysis (national, sub-national, local) approach was selected in order to provide a robust account of adaptation governance as possible. Drawing insights from other multi-level studies on adaptation (Bates et al., 2013; Oulahen et al., 2018), this study sought to understand governance via insights from multiple scales of activity in multiple cases within a country. Mutli-case site studies as illustrative of broader governance issues have been effective in merging theory and practice in the past, specifically in the adaptation literature. Amundsen et al. (2010)'s formative study on multi-level governance in Norway was one of the first to use multiple case-study sites to highlight broader issues in adaptation governance. Similarly, Juhola & Westerhoff's (2011) comparative case study of Italy and Finland, laid the ground work for much of the recent governance turn in adaptation research. Further examples of multi-case site studies, within one or more countries, as illustrative examples of wider governance issues can be found in: Henstra (2012); Bates et al. (2013), Dupuis & Knoepful (2013), Massey & Huitema (2013), Baird, Plummer, & Pickering, (2014), Hong Phuong (2018), and Waters & Barnett (2018).

Canada is a federal system in which adaptation policy choices are being made at national, provincial and local scales. Along with analysis at the federal scale, the provinces of Ontario and Manitoba were selected as provincial cases as they are representative of both higher-populated Canadian provinces (Ontario, Quebec,) and lesser-populated ones (Manitoba, Saskatchewan, Alberta). For analysis at the city scale, the largest urban centres and provincial capital of the two provinces were selected (Greater Toronto Area and Winnipeg/Brandon). Analysis began with review of relevant policy and grey-literature documents from the case sites and the national level to identify key actors and governance features surrounding existing adaptation efforts. Additionally, comprehensive third-party reviews of adaptation progress in Canada and its provinces released by the office of the Auditor General of Canada (2017, 2018) were reviewed.

To further gather insights on current modes of governance, in-depth interviews were conducted in person and via phone with adaptation practitioners from the federal and provincial governments, four municipal governments in the GTA (Toronto, Mississauga, Peel, Durham) as well as two municipalities in Manitoba (Winnipeg and Brandon). In order to capture broader perspectives, interviews were conducted with relevant practitioners from the private and not-for-profit sectors as well. Qualitative interviews with expert practitioners are an established means of accessing information about policy processes and has been applied in vast amounts of adaptation research (Franca Doria et al., 2009). In total 81 respondents participated in interviews (Table 1) which ranged in length from 45 to 90 minutes. The interview guide followed four basic themes: (1) existing experience in adaptation, (2) identification of key actors on adaptation, (3) existing roles of adaptation actors and (4) existing adaptation-related policy instruments.

Table 3.2 - Number of interviews by category

	Interviews
Canadian Federal Government	13
Ontario Provincial Government	13
Manitoba Provincial Government	18
Greater Toronto Area	14
Winnipeg & Brandon	6
Non-Governmental Local	7
Non-Governmental (regional/national)	10
Total	**81**

3.4 Findings: Current Modes of Governance in Canada

3.4.1 Adaptation Actor Roles & Relations in Manitoba

Manitoba practitioners identified adaptation as occurring within relatively small pockets led by a few key actors in the province and without a central guiding government strategy. Participants noted that the Manitoba Ministry of Sustainable Development (MBSD) is undoubtedly the lead agency on adaptation, and that it mostly took on the role of convening adaptation practitioners in the province. Respondents also identified the Ministry of Infrastructure and Transport (MBMIT) as well as the Ministry of Health, Seniors and Active Living (MBHSAL) as lead actors on adaptation in the province. Both ministries were identified as having been engaged in impacts identification, risk assessment, and some policy deliberation regarding potential adaptive actions. Other key provincial actors were the Ministry of Municipal Relations (MBMR) and Manitoba Agriculture, Food and Rural Initiatives (MBAFRI). A final key provincial actor is Manitoba Hydro, a crown corporation owned by the provincial government, which was identified as a leader in research on impact and vulnerabilities to the energy system.

The interviews also revealed key federal adaptation actors working alongside these provincial ministries, such as Natural Resources Canada (NRCAN) and Health Canada (HC). The two major adaptation initiatives in the province through which these lead actors have interacted have been the Prairie Regional Adaptation Collaborative (PRAC) and the

Canadian Adaptation Platform; both programs initiated by the federal government via NRCAN. Both PRAC and the Adaptation Platform are convening programs aimed at connecting key actors and facilitating knowledge exchange while providing funding for adaptation research. Manitoba respondents noted that most adaptation activity in the province originated in PRAC workshops and meetings. These two federal programs dominated actor relations on adaptation in the province as, other than smaller community scale activity, respondents pointed to few other initiatives in which Manitoba's adaptation practitioners would interact.

Along with these federal designed, provincially led, networks, the other significant feature in the current state of actor roles and relations in Manitoba was the perceived lack of interest at the municipal scale on climate change adaptation. Overwhelmingly respondents in the Manitoba-case (including government, industry and NGO) identified the City of Winnipeg, and most other municipalities, as absent on adaptation issues. While individual adaptive actions can be identified within the city, such as a heat warning system and a backwater valve bylaw, it was felt that neither of these policies were explicitly driven by climate change impacts. For example, the backwater-valve bylaw was operationalized in the 1970's, and, according to interview respondents, was not the result of an assessment of climate change impacts as much as an ongoing history of overland urban flooding in Winnipeg. Research indicated that the City of Winnipeg does not have an adaptation action plan, though one is in development (City of Winnipeg, 2018). Regarding the overall lack of municipal interest towards adaptation in the province, one respondent reflected on the lack of local leaders aiming to address adaptation:

> *The thing is, as we've discovered before, you need a willing partner, a willing municipality, who wants to explore this work, is willing to take on this challenge, so they need to be leaders in innovation and you need a local champion essentially.*

Finally, while the provincial government via MBSD was the identified lead adaptation actor in the province, both interview data and documents reflect the vital role of government-NGO partnerships in carrying out much of the impact and risk assessment

discussions as well as working to convene actors and promote best practices (Parry et al., 2012). Much of the convening activity orchestrated by the province was conducted by the International Institute for Sustainable Development (IISD), the dominant environmental NGO in the province. Within Manitoba, a sharing of duties with partner organizations via collaboration is core to operationalizing adaptation. The public-private and public-NGO partnerships at the provincial level are not surprising given the influence of federal programs designed around partnerships and convening (Wellstead et al., 2016). Practitioners were clear that such partnerships, while at times overlapping, had been valuable in combining multiple perspectives in impact identification, risk assessment and some degree of deliberation of adaptation options. The general consensus, however, was that these large partnerships were stopping well short of much significant adaptation implementation.

3.4.2 Policy Instruments in Manitoba

Documents and interviews revealed that implementation of explicit adaptation initiatives as supported by policy instruments has occurred sporadically within the province. While pockets of activity were identified in transport, health, agriculture, and land use, existing outputs are mainly informational and awareness-building in nature (Auditor General of Manitoba, 2017). When asked to identify what key actors had been doing regarding adaptation, respondents identified: developing and sharing information, building partnerships with NGOs and private firms to account for various interests, and discussing best practices in certain ministries or sectors (largely transport, agriculture, and health).

In review of the adaptation progress under the Prairie Regional Adaptation Collaborative (the portion of the national program active in Manitoba), a report from the International Institute of Sustainable Development (Parry et al., 2012) identified the totally of outcomes as: impact identification, risk assessment, and awareness building. Specific identified activities included development of scenarios for future water supply, promotion of a voluntary sustainable water management strategy for adoption by municipalities, development of a drought management tool, organization of workshops with City of

Winnipeg staff, drafting of a drought communication strategy, identification of vulnerability in sensitive ecosystems, and consideration of options for adaptation in the livestock sector (Parry et al., 2012). Additionally, in 2015, the province and federal government released a report written by a task force made up of industry and academics entitled Agriculture Risk Management in Manitoba. In the report, the authors called for continuing development of best practices, as well as continued use of (voluntary) market mechanisms to incentivize producers to consider climate change (Agricultural Risk Management Task Force, 2015).

While most of these activities, except for the agricultural task force report, were outcomes of the PRAC, the follow-up National Adaptation Platform also fostered some adaptive efforts in the province. A 2016 summary of activities under the National Adaptation Platform shows projects led by public-private partnerships mostly focusing on impact identification, vulnerability assessment, and development of best practices (Natural Resources Canada, 2016). Relevant to Manitoba was an analysis of coastal management and natural resource policies in northern Manitoba, promotion of climate-adaptive financial strategies for northern business, several risk assessments of energy infrastructure, vulnerability and economic assessment in the mining sector, risk assessments for transportation and infrastructure, and municipal training workshops (Natural Resources Canada, 2016).

In 2015 the government of Manitoba released a climate change plan which mostly focused on mitigation but that highlighted three adaptation initiatives (1) building local partnerships, (2) developing a marine observatory in Churchill, and (3) the aforementioned agricultural task-force. In 2017, a follow-up report from Manitoba's auditor general summarized the status of adaptation in the province as suffering from *"weak management processes for adapting to climate change impacts"* and highlighted *"no comprehensive and coordinated planning [was] in place"* and concluded there was *"little progress on assessing risks and developing a provincial adaptation plan"* with no clear policy instruments in place (Auditor General of Manitoba, 2017, 4, 17, 22).

Overall, respondents confirmed the limited action and lack of clear policy implementation. When asked to identify the most commonly used instrument in Manitoba, respondents nearly unanimously pointed to limited persuasive efforts and activities taking place via NGO partnerships along the early stages of adaptation, as summarized by one participant:

> *The actions that have been taken so far, yeah, that's a good question. I guess most of the action that I see has been voluntary and on the outside of government, I'm trying to think of some examples of where the government has actually taken the action to completion.*

Ultimately, much like the 2017 report from the Auditor General of Manitoba, both document review and interviews indicate that adaptation in Manitoba as conducted by both provincial and federal programs is mainly at a stage of information sharing, sporadic hazard assessment, sporadic analysis of risks and vulnerability, and promotion of voluntary adaptation options to industry and municipalities. In general, this was seen by respondents as a lack of progress on adaptation in the province, with several explicitly referencing the situation as consistent with Burton's (2006) adaptation (implementation) deficit. Reflecting on the lack of unified adaptation strategy and more comprehensive implementation, one respondent noted:

> *Within Canada as a whole…you have this implementation gap, you don't have a whole lot of organizations like doing the translating the research, the academic literature, into practice, and there's a bit of a gap there, and probably more synergies would be helpful because we know that Canada has a lot of academic excellence in the area of adaptation, but we don't see a lot adaptation in the ground, particularly in the prairies, its an interesting gap.*

3.4.3 Classifying Adaptation Governance in Manitoba

Adaptation in Manitoba is dominated by the presence of, and reliance on, federal and provincial actors engaged in interdependent and mostly equal collaboration with NGO partners as well as use of diplomacy for voluntary engagement. This governance landscape

has facilitated pockets of action within the early stages of the adaptation cycle (i.e., impact identification, risk and vulnerability analysis, and deliberation of adaptation measures) through these partnerships but has been limited in provincial-wide programing and implementation of adaptive measures beyond the voluntary type. As a lead actor, Manitoba Ministry of Sustainable Development (MBSD) does an admirable job in attempting to coordinate and monitor all adaptive activity as well as in using limited resources to support programs. Overall however, respondents noted a lack of adaptation implementation in the province despite a healthy (if not repetitive) amount of impact identification and deliberation.

To summarize, key governance features around adaptation in Manitoba are as follows: the dominant actors and their roles are the provincial government (operating through federally designed convening programs) and NGO organizations acting as conveners; and dominant actor relations are managed by these lead actors in voluntary, co-committal, convened relationships consistent with the collaborating design of the federal adaptation programs (Bauer & Steurer, 2014; Henstra, 2017). This landscape of government, NGO, and industry partners has led to policy outcomes such as awareness-raising efforts, research partnerships, and voluntary guidelines, while other policy instruments such as market-based tools and regulation are absent. Based on these characteristics, it can be concluded that adaptation governance in Manitoba is structured predominantly in a network mode (Table 3.3).

Table 3.3 - Identified governance features in Manitoba-Winnipeg

Key Actors	Prominent Actor Relations	Prominent Policy Instruments	Dominant Governance Mode
Federal Government Provincial Government Crown Corporation NGOs	Convening Reciprocal Partnerships Non-Coercive	Persuasion Awareness Building Economic Incentives	Network

3.4.4 Actor Roles & Relations in Ontario

In the Ontario case, respondents consistently identified municipalities, such as Toronto, Mississauga, Peel Region, York Region, and Durham Region as the lead actors on adaptation in the province. On the question of lead actors in the province, one respondent summarized the current scenario as follows:

> *I think in the Ontario case; the key actors are municipal staff. I would write the province out of it completely, I don't see that they have done a whole lot, they have committed to do some things over the years that they haven't really done, I think they are quite disappointing on the adaptation file.*

Overall, regarding key adaptation actors across the province, respondents both in the GTA and those operating at national and provincial scales pointed to the City of Toronto, and municipalities of Markham, Mississauga, Peel, and Durham. Along with these municipal actors, respondents also identified non-governmental organizations such as the Ontario Climate Consortium (OCC), the Ontario Centre for Climate Impacts and Resources (OCCIAR) and the Canadian branch of the International Council for Local Environmental Initiatives (ICLEI) as playing vital roles in convening actors, fostering connections, and developing and sharing climate information. However, a few respondents noted that at times OCCIAR, ICLEI, and the OCC overlapped too much, thus outcompeting one another for limited funding. Overall however, the active community of research organizations taking on adaptation work in Ontario was considered as a crucial backdrop for much of the municipal leadership. Regarding actor roles, in many cases, respondents noted the NGOs as the conveners and researchers, and the municipalities the 'doers'.

Along with these boundary organizations, federal initiatives such as Natural Resources Canada's Adaptation Collaborative and Adaptation Platform were praised for providing Ontario practitioners access to valuable connections, especially in impact identification and vulnerability assessment methods. Respondents noted the lead role of NRCAN and its national programs, highlighting the value of the RACs and the Adaptation Platform as

convening and information gathering forums. As an aside, respondents suggested there was also some confusion regarding who the federal lead on adaptation was, as the Ministry of Environment and Climate Change Canada was often involved in adaptation initiatives as well.

Respondents in the Ontario case also noted the leadership role of the federal government in the province through Health Canada in convening and information-sharing roles, as well as partnering with local governments, notably in the case of Toronto's heat vulnerability assessment. Conversely, most respondents in the Ontario case were critical of the provincial government due to a perceived lack of action on adaptation despite their involvement in these federal programs. As they pointed out, despite action by 'champion' municipalities in the GTA, adaptation action across the province was limited by the lack of provincial leadership.

3.4.5 Policy Instruments in Ontario

When asked about activity and policy instruments related to adaptation in the province, respondents across all scales spoke predominantly to municipal examples. In the case of Toronto, multiple risk and vulnerability assessments have been completed in the city regarding energy infrastructure (Clean Air Partnership, 2015), health (Toronto Public Health, 2011), and utilities and transportation infrastructure as part of the Climate Change Risk Management Policy the city passed in 2014 (City of Toronto, 2016). Additionally, the city of Mississauga has been convening insights and conducting research on extreme rainfall for over a decade, while municipalities of Peel, York and Durham had all been engaging private and public stakeholders to identify risk and develop adaptation priorities.

The city of Toronto was most often noted as leading on adaptation by respondents, mostly in relation to their willingness to use bylaws in several places directly related to climate change impacts. For example, in 2006 the city moved from voluntary green roof promotion to mandating green roofs on buildings of certain sizes and setting standards for their capacity to retain and slow rain water (City of Toronto, 2018). Toronto has also had a

downspout disconnection program for private residents since 2003 and moved from a voluntary program to mandatory disconnection in 2007 (Kovacs et al., 2014). The city has been mandating action internally as well, including the Climate Change Risk Management Policy, which includes a high-level risk assessment across government departments carried out by the Environment and Energy Division. According to city officials, the high-level risk assessment was directly influenced by extreme weather events in 2013 and consideration of climate change impacts.

Similarly, in relationship to ongoing work from Toronto Public Health in partnership with Health Canada on heat vulnerability, internal requirements for shelters and housing for vulnerable persons during extreme weather have been updated (City of Toronto, 2016). Along with these regulatory approaches, a highly visible information campaign aimed at promoting awareness around extreme heat has also been operationalized in the city based on specific heat vulnerability assessments (City of Toronto, 2017). Activities in Mississauga were also prominent in the interview data regarding policy instruments in the province. The city has undertaken a somewhat novel approach to stormwater management through a permeable surface tax (City of Mississauga, 2017). In discussing policy instruments and adaptation in Ontario, one respondent noted that while much adaptation research had begun with a 'softer approach', as evidenced by these municipal cases discussed here, a shift towards regulatory or market policy instruments was emerging in the province, especially at the local level:

> *I think perhaps the shift has happened, in the past it was almost entirely voluntary, and it is now diversifying, we're seeing each of the other types, there are still the voluntary piece, but we are seeing more and more movement in to the incentive-based or the regulatory-based.*

In contrast to the regulatory and market instruments being used in Toronto and Mississauga, the Ontario provincial approach to policy instruments for adaptation was criticized by respondents for leaning too heavily on limited percussive actions and 'best practices'. In 2011, the Government of Ontario released *Climate Ready: Ontario's*

Adaptation Strategy and Action Plan (Government of Ontario, 2011) which consisted of 37 actions that the province intended to undertake by 2014. A 2014 review by the Environmental Commissioner of Ontario was critical of provincial progress, asserting that there had been only limited action on infrastructure guidelines and even less action on infrastructure vulnerability assessments, the two key commitments of *Climate Ready* (ECO, 2014). A report from the Auditor General of Ontario (2016) identified that only 30% of the *Climate Ready* plan had been completed as of 2016, and that the province had been limited in implementation of any significant adaptation programming.

However, since *Climate Ready*, the province has released updates via Climate Change Strategy documents in 2016 and 2017. Among significant actions, the province amended the Provincial Policy Statement for land-use planning to state: *"Planning authorities shall consider the potential impacts of climate change that may increase the risk associated with natural hazards"* (Government of Ontario, 2014). This requirement is now a 'minimum standard' for land use planning in all Ontario municipalities. Although a common theme in interview testimony was that the province has been an absent player in adaptation, this view was not unanimous and further document analysis revealed the provincial government was not entirely idle on adaptation, as evidenced by the changes to land-use planning requirements. As one respondent put it when discussing these recent efforts:

> *Sure, well for the province, they were quite absent even as far back as three or four years ago they were almost entirely absent in providing any guidance or even open communication. I think that they were very challenged with the science, they were challenged with the implications…but they have at least, in the past couple of years, come to the table with policy reform. So that's, you know, showing a level of leadership that hadn't been present before. What still, I guess, needs to come is a commitment to providing guidance and how to implement those policies.*

Overall, local and NGO respondents remained cautious in their optimism for action from the provincial level, as no large-scale programing was in development, and the government was seen as severally behind on adaptation implementation. At the time of the study, the

Ontario provincial government was in the process of developing a provincial hub for climate information sharing, but no major policy activity was identified as forthcoming.

3.4.6 Classifying Adaptation Governance in Ontario

In the governance of adaptation in Ontario the key actors are municipalities implementing climate change efforts, the federal government though its Adaptation Platform, and non-governmental organizations convening actors and sharing information. Relations between actors take place in mostly-NGO or federally convened gatherings of government, NGO, and private stakeholders. At the local scale, municipalities are establishing a mix of voluntary, regulatory and market relations with external-actors via regulation or taxation, distinct from the voluntary approaches of the provincial and federal scale.

Assessing the ongoing mode of governance around adaptation in the province as a whole it can be said that Ontario has the same general network approach from federal and provincial scales as was found in the Manitoba context, with the unique presence of pockets of hierarchy and market governance at the local level. This assessment is based on observations consistent with network governance, such as the prevalence of non-governmental organizations as partnering actors, informal communities of information gathering, promotion of best practices and the self-organized nature of adaptation in the absence of provincial government steering (Thompson, 2003; Hall, 2011). The key governance components identified are presented in Table 3.4.

Table 3.4 - Identified features of adaptation governance in Ontario

Key Actors	Prominent Actor Relations	Prominent Policy Instruments	Dominant Governance Mode
Local Governments, Federal Government, Non-Governmental Organizations	Local: Mix of Authoritative, Market and Reciprocal Provincial: Reciprocal	Local: Persuasive, Regulatory, Market Provincial: Persuasive	Network with Hierarchy emerging from local scale.

3.4.7 Evidence of Network Failure

Our analysis revealed that network governance was the dominant mode around adaptation in Canada. As the following examples indicate, another key finding was that of respondents

describing known components of network failure, though with without using the language of governance theory. As discussed, the defining feature of governance failure for network modes can be summed up in Meuleman's (2008, 50) *"never ending talks, no decisions"*. Because of this, network modes of governance have been under considerable scrutiny for over three decades for their inability to foster consistent policy implementation (Rhodes 1988; Thompson et al., 1991; Kickert, Klijn, & Koppenjan, 1997; Thompson 2003; Meuleman 2008). As discussed above, adaptation is currently known to suffer from its own implementation deficit, a feature recognized across the international literature. After analysis, it became evident that not only did our respondents describe network governance and an implementation deficit, they also made relations, in their own words, between the two by describing challenges for adaptation consistent with this prominent feature of stagnation in network failure.

For example, the most common critique of network governance is its implicit assumption that increased capacity from resource exchange and partnerships between state and non-state actors will lead to the solution of policy problems despite evidence to the contrary (Dixon & Dogan, 2002; Peters & Pierre, 2004; Bevir 2009; Bevir 2012; Torfing, 2012). Respondents directly noted this feature of network failure not only in their own regions, but as a general feature of adaptation in Canada. As one respondent from a local research organization put it:

> *Its not that people don't want to collaborate, this country is probably world champion collaborators, so I don't find that an issue, it's the multiplicity that causes you know paralysis and inaction and confusion. And that's been disappointing over quite a few years.*

This is consistent with other adaptation research which has reviewed networks around adaptation and concluded that increased capacity developed from these networks alone did not lead to adaptation but the connection to network failure was not made (Smit et al. 2001; Bates et al., 2013; Baird et al., 2014; Mimura et al., 2014). Returning to our data, one

respondent expressed frustration with the provincial government's approach in Manitoba to continually study adaptation in the face of such stagnation:

> *My fear is that if you lock* it *into a government bureaucracy of some kind then they're gonna try to do exactly what they shouldn't do, that is measure the shit out of it and not do anything.*

In exploring network failure, it has also been argued that presence of numerous private or non-governmental firms who might bear the cost of policy action by the state, while politically attractive, often leads 'a race to the bottom' in the form of the weakest possible policy instruments and/or stagnation (Thompson 2003; Peter & Pierre, 2004; Hall 2011). For Peters & Pierre (2004) the informal and relational nature of networks creates what they call a Faustian Bargain, in which weak or meaningless consensus is fostered by powerful network actors outside the realm of constitutional order. The participatory and voluntary nature of networks is the reason it is assumed to generally lead to persuasive policy instruments and politically attractive self-regulation over other 'harder' regulatory or market policy instruments (Meuleman 2008; Hall 2011; Bevir 2012; Zehavi 2012). As one local Ontario official put it regarding their recent efforts to implement adaptation, there is a perceived unwillingness to take political risk inherent in adaptation implementation:

> *We spent a lot of time planning, right, and you know,* [local program] *took us three years to develop, to do the plan, but now we are implementing, and I think that is part of the issue, is that, we gotta stop studying these things and start doing them. You know from a government point of view, its safer, its way safer, to examine, to study, to plan, then it is to actually do, right? And I think we need to get over that hurdle and start putting projects in place, start building things. And its not like you don't know what to do, you don't have to look at the tens of reports, they're just copy and paste by now, you know.*

This perceived political attractiveness of the network arrangements emerged in interviews with other respondents who had recognized that partnerships were *"the buzzword of the*

day" even if they rarely led to action. As one researcher put it when asked about issues of collaboration on adaptation:

> *You know there's been collaboration, and in some ways, I would say the federal government goes out of its way to try and work with other levels of government. I don't have an issue with that, I mean sometimes its actually the opposite problem, you get a contract or project from the federal government they often want to involve more partners than is really useful or practical, they love partnerships, I mean, they, both levels of government, have divisions that are all about encouraging partnerships I think sometimes for partnerships sake. Its something again, politically, they find attractive.*

Ultimately our analysis not only characterized the dominance of network governance in our two case sties, but also revealed an inherent connection between an over-reliance on network logic and the presence of common governance failure in the network mode, that of an implementation deficit. As our respondents described, not only is adaptation mostly stagnant in both sites, but that the issues of *"never ending talks, no decisions"* and the hesitation towards 'harder', potentially politically unattractive, policy instruments are evident.

3.5 Discussion

It is easy to recognize that mobilizing highly networked modes of governance can be attractive for climate change adaptation. First, networks legitimately offer the promise of being able to capture the complexity of wicked problems such as climate change adaptation. Second, they rely on a political low-risk relational process and non-disruptive policy instruments that are unlikely to affect electoral concerns. Finally, resistance to use of stronger levers or *"hard policy instruments"* may also be justified given the uncertainty of climate hazards (Zehavi, 2012). While these promises of networks are no less real than those of competing modes of governance, their uptake by governments and scholars alike has led to what Borzel (2011) calls the reliance on a functionalist fallacy. That is, network

success rests on the underlying structuralist philosophy that collective perception (negotiated interpretation) will lead to appropriate governance outcomes (namely policy instruments). In short, networks assume that bringing together interested parties and finding a mutually acceptable solution is the antidote to policy problems.

While it may be tempting to suggest that alternative governance modes would avoid the implementation deficit (based on their known strengths and limitations), they too are capable of failure, and it is also possible that the role of the state so far in the steering actor roles has been too weak for networks to be effective. In this sense, it would be premature, and impractical, to suggest any sort of abandoning of network governance for adaptation. Therefore, we identify that the operating governance modes around adaptation in Canada are not adequately combining features of hierarchy, market and community modes as complimentary to network polyarchy (Duit & Galaz, 2008). At the same time, it would be foolish to overlook that policy implementation deficits are a cornerstone of network governance, per Hall (2011, 445), when it comes to addressing implementation deficits, one must recognize that *"deficits are inevitable"* in network governance.

For Rhodes (1997), successful governance, either network steering or otherwise, requires that state practitioners become adept at achieving policy goals via the effective combination of diplomacy or coercion. Similarly, Thompson (2003) asserts that networks cannot be left unattended and that hierarchy and market principles must be complimentary to effective network governance (we would add components of community governance). Peters & Pierre (2004,175) remind us that networks are embedded in constitutional order: *"what makes the informal exchange efficient is that it is embedded in a regulatory framework"* and that this should not be forgotten. For Duit & Galaz (2008, 329) *"the robust governance type is dependent upon resolving the fundamental tension between institutional stability and flexibility"*. Therefore, the value of voluntary relations, flexible instruments, and partnerships in representative democracy is only realized in modes at least partly influenced by hierarchy. The need to infuse network modes with principles of other

governing orders is why many scholars conclude that ‘it is the mix that matters’ when operationalizing governance (Rhodes, 1997).

No single governance mode is optimal across all issues and in the case of climate change adaptation appropriate governance may vary between scales, sectors, and impacts. Moving forward, identifying effective governance based on unique circumstances will be crucial for adaptation research and initiatives across sectors and jurisdictions. To do so, governance must be able to be robustly characterized, to identify both what is, and what is not, occurring. As Borzel, (2011, 58) states regarding governance scholarship’s hesitance to invoking other modes:

> *Rather than reifying networks as omnipresent governance forms and treating them as governance panacea, we need to explore the different governance regimes* [modes] *or governance mixes as well as their capacity to provide collective goods in an effective and legitimate way.*

We present that our identification and description of network governance is unique in its rigour and reference to an established theoretical framework of competing governance modes. In the end, along with describing current adaptation governance in Canada as network dominated, our analysis also offers reason to reflect on the effectiveness, or appropriateness, of the network form for the issue of adaptation. Based on the known limitations of network governance, and the observed consistency between ‘network failure’ and the adaptation implementation deficit, we contend that existing governance approaches to adaptation in our case sites have been too enamored with network logic. Further studies in a broader swath of sites are needed to further this discussion.

3.6 Conclusion

While networks remain fashionable and potentially carry less political risk than other modes, the reality, and urgency, of climate change impacts are at times incompatible with the interpretive, negotiation-based, logic of networks let run amok. It has been argued that adaptation suffers from inherent uncertainty and lack of agreement regarding the problem

(Mazmanian, Jurewitz, & Nelson, 2013). If adaptation is already prone to indecision due to uncertainty and disagreement, then governance arrangements need to be fostered around the issue that counteract these rather than reinforce them. While vulnerability does vary, and its assessment must be participatory, the subjective nature of network negotiation cannot be expected to fully address the very real climate change impacts currently occurring and projected to worsen.

As the stages of the adaptation cycle progress across jurisdictions towards implementation and monitoring, the dominance of network governance may need to be reduced in order to reach implementation. Ultimately, this provides the challenge for governments of effectively reigning in networks and combining their participatory strengths with those of other modes (Sorenson & Torfing, 2009). Effective mixing of governance modes is no easy task (Pahl-Wostl, 2015), but it is clear that current network-reliance is unlikely to be completely effective for adaptation. How long it will take climate change adaptation practitioners to find the right mix of governance modes to address their unique problems remains to be seen.

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Chapter 4

4 Climate Change Adaptation and Alignment of Governance Visions

Abstract: Climate change adaptation has emerged as a complex area of public policy due to the breadth of issues to be addressed and the myriad of actors involved. Because of this complexity much research on adaptation has turned towards governance perspectives to account for the interactions of multiple actors across multiple scales of adaptation. In recent years, significant contributions have been made to identifying governance related barriers to effective climate change adaptation. One of the most prominent of these barriers has been the recognition of a potential misalignment in approaches between local orders of government and higher orders at sub-national or national scales. In this paper the results of a research project aimed at gathering insights from practitioners across all orders of government in Canada regarding preferred approaches to adaptation governance are presented. Based on in-depth interviews and workshops with expert practitioners we identify that while there is a general alignment in perception of necessary actor roles on adaptation, the means of adaptation when it comes to actor relations and policy instruments are more contested. Our analysis shows a distinct governance gap between local and higher order adaptation practitioners, specifically regarding disparate interest in network-style persuasive governance and hierarchical-style regulatory governance. The paper closes with consideration of this finding in relation to the broader 'governance barriers' discussion.

4.1 Introduction

Climate change adaptation has evolved as a complex policy area due to the breadth and variety of climate related hazards and the cross-jurisdictional challenges inherent in addressing impacts (Noble et al., 2014). Many sectors face their own unique challenges, making large-scale national or regional planning difficult as various approaches and concerns need to be coordinated across sectors, impacts, and jurisdictions (Henstra, 2017). It is commonly recognized that no single level of government, private firm, or individual has the capacity and resources necessary to address climate change independently (Mimura

et al., 2014). What emerges from such a scenario are complex arrangements for the governance of climate change adaptation that include numerous actors and coordination efforts across multiple scales. As these complex arrangements have evolved in practice, much adaptation research has engaged in discussion of governance features.

A key notion emerging from this work has been that of governance-related barriers to adaptation progress. As summarized in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report, many of the most common barriers to adaptation relate, in some way, to issues of *"multilevel institutional coordination between different political and administrative levels in society"* (Mimura et al., 2014, 871). As such, adaptation has become known as a governance challenge in which the roles of actors across scales, and their relations to one another are increasingly analyzed in pursuit of 'effective arrangements' (Frohlich & Knieling, 2013). A central concern of this pursuit has been the coordination of efforts between local governments, who are seen as being at the forefront of climate impacts, and the resources and strategies of national or sub-national governments (Dickenson & Burton 2011; Henstra 2017). While the need for coordination is obvious, the roles of specific actors to foster it remain unclear. Ultimately much attention in adaptation governance scholarship has related to the simple question of "who does what, and how?" in fostering effective adaptation.

In this paper, we contend that while it is understood that effective adaptation governance requires coordination between local and higher orders of government, there remains limited insights on what visions of 'effective governance' of adaptation actually look like across orders of government in multilevel states. We argue that identifying whether there is alignment in governance visions can provide valuable insights into crafting regional and national arrangements for adaptation strategies. While past research has suggested that governance interests may differ across scales (Adger et al. 2005; Amundsen et al., 2010; Picketts et al., 2012; Oulahen et al., 2018) empirical investigation of preferred approaches is lacking.

Using Canada's federal system (local-provincial-national) as a reference point, this study employs a framework of distinct governance modes to compare visions of effective adaptation amongst experts at multiple orders of government. To do so, in-depth interviews were conducted with 44 government adaptation practitioners in two Canadian provinces and multiple municipalities. As well, two multi-level expert workshops were held which included representatives from all three orders of government. Through this multi-method approach it was found that while actor roles for climate change adaptation in the multilevel federal system of Canada are relatively well-accepted across respondents, preferred actor relations and policy instruments vary more drastically. Our data show that respondents in higher orders of government (federal and provincial) are strongly committed to network governance arrangements with a general disinterest to regulatory approaches. Conversely, we found that local government respondents showed varying degrees of dissatisfaction towards network logic and increasing interest in invoking, or adding, features of hierarchical governance as a means to move forward on adaptation.

Section 4.2 reviews the literature on adaptation governance and the emergence of 'governance as a barrier' as a theme in adaptation research. Section 4.3 briefly outlines the design and methods of the study before sections 4.4 provides the study's findings. Section 4.5 discusses the findings in reference to the broader adaptation governance literature.

4.2 Literature Review

In recent years, climate change adaptation has undergone an apparent governance shift. Distinct from the shift alluded to in the wider governance literature in which public policy moved from command and control conventions into multi-actor networks (Rhodes, 1997), adaptation's governance shift has seen the growing connection between the field of public governance and climate change adaptation in describing, and accounting for, empirical findings. Adaptation governance refers to the roles and relations of actors involved in the process of preparing for, and adapting to, climate change (Frohlich & Knieling, 2013). In short, much of the research on adaptation governance asks: 'who does what and how' in preparing and adapting society for the impacts of climate change. These questions have

emerged as drivers of much empirical analysis and discussion over the past decade in response to calls for an intensified focus on clarifying actor roles and policy approaches. Such calls are mostly due to the cross-sectoral, multilevel, policy challenge presented by climate change impacts (Henstra, 2017; Bednar & Henstra, 2018).

A significant portion of research on adaptation governance has focused on interactions between local and higher-orders of government. As will be discussed below, the reasons these relationships have achieved much attention are related mostly to three known adaptation needs at the local level: (1) the need for resources at the local level, (2) the need for incentives at the local level, and (3) the need for regional coordination of local efforts to avoid maladaptation and foster consistency. In order for local governments to reach these needs it is argued that alignment in vision between orders of government is required (Amundsen et al. 2010; Oulahen et al., 2018). In the empirical adaptation literature, a general consensus has emerged that effective inter-scalar processes between local governments and national or sub-national authorities are essential to enhancing adaptation implementation at the local scale (Mimura et al. 2014; Huitema et al. 2016; Juhola 2016). Hence, while much adaptation implementation may be local in scale, local and national governments have to be aligned on processes of funding priorities and trade-offs, knowledge transfer, institutional responsibility, resource provision, and policy direction, among other issues to meet the aforementioned needs (Noble et al., 2014).

In a formative adaptation governance study in which the authors applied a governance lens to the policy problems presented by climate change adaptation. Amundsen et al. (2010) identified the specific barrier of a lack of adaptation focus at the national level as responsible for a lack of interest in adaptation initiatives among municipalities. In their review of adaptation governance in Norwegian municipalities, Amundsen et al., (2010, 288) initiated much of the recent focus on local-higher order relations by concluding:

> *A multilevel governance framework advancing proactive adaptation and the establishment of institutional capacity at the municipal level is of great important to handle the challenges of climate change adaptation. In that regard there is a*

> *need for more research to increase the understanding of how different levels of governance influence and interact with each other and of the processes leading to efficient networks and interactions between and across governance levels.*

Among key studies that emerged in the aftermath of this conclusion, Juhola & Westerhoff (2011) similarly found that a lack of attention regarding the coordination of and support for sub-national and local adaptation efforts by the national government limited implementation at the local level. A primary component of this was that local efforts, if not aligned with institutional support at higher orders, often went unsupported politically, were underfunded, and were therefore limited in scope as they could not manage the involved actors with limited resources. The authors noted that even when local actors can foster networks to begin adaptation work, resources and 'steering capacity' from higher orders remain necessary for all but the largest local actors (Juhola & Westerhoff, 2011). In follow-up work, Juhola (2016) further confirmed that barriers to adaptation at the local level could not be addressed without modifications of the actions of national governments. Similarly, among their findings, Measham et al. (2011) argued that the ability for local governments to adjust their planning policies to account for climate impacts was (in their Australian case study) limited, and ultimately rested on reform at the national level. One of the reasons for this was that in the absence of influence from higher orders, local adaptation initiatives were out-competed for funding and attention by other local interests (Measham et al., 2011).

In a comparison of framings of adaptation across multiple scales, Juhola et al. (2011) found differences between local views of adaptation compared to those at the national level. In the case of Juhola et al. (2011), these differences were not related to governance (actors and instruments) but problem definition. The authors found, broadly, that lower orders of government framed adaptation largely as a vulnerability of persons and infrastructure issue, while higher order governments, and regional bodies, were more prone to planning or economic risk frames (Juhola et al., 2011). Of particular relevance to this study is the authors' conclusion that: *"different persuasive arguments are used to support or*

undermine the need for adaptation and reveal underlying rationales for environmental policy-making" (Juhola et al., 2011, 640). This notion, that the conceptualization of adaptation affects policy implementation, is crucial in considering governance. Governance arrangements too are arguments, or visions of effective public response, they are *"implicit theories…of the proper action of government on the one hand and of social interaction and change in social systems on the other"* (Hall, 2011, 438). Applying the findings of Juhola et al. (2011) to the case of governance highlights that preferred approaches for the arrangements of climate change adaptation then are not inconsequential, they are visions of acceptable means of government intervention and actor relations in planning and implementing adaptive measures.

The challenge of effective adaptation posed by a lack of coordination across orders of government has not only been observed in practice, but in public perception as well. In exploring public perceptions of the governance of adaptation in Australia, Waters & Barnett (2018) pointed to distinct roles identified by respondents. Their study revealed a preference among the public for the national and sub-national (state) governments in Australia to act as coordinators of adaptation efforts to assure consistency. Interestingly, Waters & Barnett's (2018, 717) highlighted that even amongst 'non-experts' who are not actively involved in adaptation governance, there was concern over *"local variations leading to disjointed local and regional planning".* Evidently in both expert and non-expert communities there is a shared interest in coordinated, cross-scale, approaches to adaptation in multilevel systems as mediated by higher order governments.

Recent work in Canada, the focus of this study, has also addressed relations between local and upper order governments. Bauer & Steurer (2014) argued that federal programs in Canada fostered a partly hierarchical relationship between federal and provincial scales. The authors conclude that the adaptation governance style of both the federal and provincial orders of government entailed a mix of network and hierarchy modes in engaging local governments. However, their study neither offered a comprehensive view of governance (e.g. actor roles, actor relations, and policy instruments) nor discussed

whether there were any competing governance visions from provincial interests but instead focused on the lack of provincial input into the federal design of adaptation priorities as an indication of hierarchical influenced networks (Bauer & Steurer, 2014). Ultimately, Bauer & Steurer (2014, 128) concluded that even if local and sub-national or national governments co-operate in a network governance arrangement, it does not necessarily erase the challenge of cross-scale coordination such as resource provision and incentivization, as these cross-scale relations are mediated by the 'weak political status' of collaboratives to address the above-mentioned needs of resources, jurisdiction, and coordination.

Finally, Oulahen et al. (2018) identified misalignment between local and higher order governments in perceptions of mainstreaming climate change. The authors identified 'limited vertical integration' as a barrier to effective adaptation mainstreaming in two British Columbia municipalities, and argued that *"misalignment of policies within or between levels of government is a significant barrier to adaptation"* (Oulahen et al., 2018, 11). The authors point specifically to a lack of mechanisms for regional coordination or harmonization of local efforts. The authors found disparate views of effective flood planning between local and provincial orders, and that uncertainty, or lack of clarity in provincial regulations, fostered inaction at local scales. The authors presented conclusions consistent with the above research, that in addressing various aspects of local adaptation (mainstreaming and flood planning in their case) potential enabling or prohibiting processes at all scales of government need to be considered.

4.3 Research Gap and a Typology of Governance

While coordination between local and higher order governments as necessary for adaptation has increasingly been discussed in the literature, there is a lack of research explicitly comparing, between levels of government, their governance preferences, or visions. As discussed, many studies point out that governance-related barriers exist because of the misaligned relations between orders of government, (Urwin & Jordan, 2008; Amundsen et al., 2010; Juhola et al., 2011; Juhola & Westerhoff 2011; Measham et al., 2011; Oulahen et al., 2018) but few engage in direct comparison of approaches or

preferences for the governance of adaptation. We contend that inter-scale coordination issues such as resources, jurisdiction, and coordination all relate, fundamentally, to visions of governance and therefore issues of actor roles and the use of policy instruments in actor relations.

Further, there remains a need to study governance features as purposeful outcomes and as the direct objects of examination rather than external constraining factors affecting other processes. Too often the governance is treated as a process external to adaptation and the coordination issues that emerge. Accordingly, competing modes of governance are not considered for their potential as causes or solutions of these barriers or the misalignment causing them. According to Wellstead, Howlett, & Rayner (2013, 2), in most adaptation research *"governance [is] treated not as a major independent determinant of policy content but simply as another input variable that needs to be calibrated in order to positively affect adaptive capacity".* This is problematic as governance arrangements are not *a priori*, nor apolitical; they are, as mentioned, 'implicit theories' about the role of the state, the relations of actors and the means to solve problems (Hall, 2011). In this sense, alternative governance arrangements represent alternative theories, or visions, of how adaptation *ought* to be addressed across scales of government. Identifying whether there is alignment in perceived appropriateness for adaptation actor roles and instruments at different orders of governments is valuable in so far that it might identify competing conceptions of governance that are being promoted or supported in operation, and eventually leading to misalignment of adaptation approaches and unfulfilled needs across scales of government.

To address this, practitioner insights on visions of effective adaptation across all three orders of Canadian government were examined for the purpose of both description and comparison with the goal of identifying if adaptation governance was perceived differently at different scales. This would further allows the identification of potential pathways forward on reconciling approaches should they differ. In short, we identified that no one had asked the simple question of whether government practitioners operating at different

scales perceived that adaptation ought to be governed differently. We contend that our approach to exploring adaptation governance is novel as few studies have engaged primary data collection at three scales, and to our knowledge, none have compared visions of adaptation governance across different scales.

In order to have conceptual framework in which to place practitioner visions we operationalized a common typology of governance modes found throughout the governance literature (Meuleman 2008; Bevir, 2009, Borzel 2011, Pahl-Wostl 2015). In doing so we address an additional gap in the adaptation governance research as studies rarely employ the term governance in any systematically defined way. In much adaptation research, governance, as either processes or structure, is rarely explicitly defined or constrained, and, more often than not, is placed in a black box of undefined, uninterrogated, and non-distinct, apolitical processes (Wellstead et al., 2013; Eriksen, Nightingale, & Eakin, 2015). Therefore, in order to open up the black box of governance and more systematically compare governance visions across orders of government, this study employs a robust governance typology consisting of hierarchy, market, network, and community modes as distinct arrangements of social coordination (Table 4.1) (Pierre & Peters, 2000). The typology, and its discrete features (actor roles, relations, and policy instruments) offer greater analytical clarity in describing and comparing adaptation governance both theoretically and empirically.

Table 4.1 - The four-mode governance typology

	Hierarchy	**Market**	**Network**	**Community**
Actors with Dominant Roles	Federal, regional and local governments	Government, private industry and other market actors	Government, private sector, and non-governmental experts	Citizens, community groups, neighbourhood associations
Actor Relations	Top-down, coercive	Circular (based supply and demand)	Horizontal, collaborative	Bottom-up
Typical Policy Instruments	Legislation and regulation	Supply and demand; government market intervention	Persuasion, negotiated agreements, codes of practice, voluntary programs	Self-regulation, voluntary participation

4.4 Design & Methodology

To compare visions of governance across orders of government, the Canadian federal government and two Canadian provinces as well as their most populous urban centres were selected for analysis. Much existing empirical work on adaptation governance has been undertaken in European states with unitary constitutional orders (Kestkitalo 2010; Rykkja, Neby, & Hope, 2014) whereas research on instruments, roles, and relations in federations such as Canada and the United States has been less developed (Henstra, 2017). While offering insights comparable to much of the existing governance research in Scandinavia and the U.K. we also identified that the Canadian case studies would offer novel insights to adaptation governance in the North American context. Nonetheless, in both European and Canadian literature, the same commonly recognized challenges of inter-scale government coordination discussed in the global literature have been identified (Burch, 2010; Henstra. 2012: Bauer & Steurer, 2014; Oulahen et al., 2018), so the Canadian case provides generalizable insights.

Along with the above summarized Amundsen et al. (2010) and Juhola & Westerhoff (2011), further examples of case studies, within one or more countries, as illustrative

examples of wider governance issues, can be found in: Henstra (2012); Bates et al. (2013); Dupuis & Knoepful (2013); Massey & Huitema (2013); Baird, Plummer, & Pickering (2014); Hong Phuong (2018);, and Waters & Barnett (2018). Additionally, except for Oulahen et al. (2018), much of the empirical research in Canada, as well as in most other developed federal states, has focused on single orders of government, such as federal (Bauer & Steurer 2014) or local (Burch, 2010; Picketts et al., 2012). Given the lack of analysis of governance features across Canada's multilevel design, we sought to use the Canadian context to fill this additional gap in the North American empirical literature.

Interviews were conducted with climate change adaptation practitioners (N = 44) from across all three orders of government. For representation from higher-order governments adaptation practitioners from Manitoba (N = 15), Ontario (N = 8) and the federal government (N=8) were interviewed. For local level insights respondents from the cities of Winnipeg and Brandon (4), the Greater Toronto Area (GTA) (9) were interviewed. Interviews were semi-structured and ranged from 45-90 minutes in length. While it is recognized that practitioners in bureaucratic, and unelected roles do not directly establish governing orders, the perceptions of experts involved in the daily operation of adaptation are a starting point for visions of adaptation governance recognizing that future research could explore the perspective of elected officials as well.

Interview respondents were asked questions in three broad themes: (a) past experience in climate change adaptation, (b) observed and desired roles and relations of various actors on adaptation issues, and (c) observed and desired policy instruments for climate change adaptation. Policy instrument options were presented via a common triad typology of regulatory, market and persuasive (Henstra, 2015), but specific instruments within these types were often discussed by respondents as well (as will be shown). Other than the basics policy instrument triad, no pre-categorized roles or relations were presented to respondents in the interviews. Interviews were recorded and manually transcribed, and analysis of emergent themes was aided through the use of NVivo qualitative analysis software (Cope, 2014). Responses were coded based on the pre-existing governance framework as well as

with nodes of ‘current’, ‘desired’ and ‘undesired’, all other codes (such as specific policy instruments or actor roles, and actor relations) emerged organically (Babbie & Benaquisto, 2010; Cope, 2014). Because there was relative consensus in responses between provincial and federal respondents in much of the data, the analysis focuses on distinction between local and higher order government practitioners.

The interview data was supplemented with two expert workshops held in Canada’s national capital Ottawa (8 participants) and the city of Toronto (9 participants). Both workshops included participants from federal, provincial and local governments in Ontario, as well as relevant industry, NGO, and academic subject matter experts. The workshops focused specifically on idealized actor roles and policy instruments in adaptation governance through a visioning exercise common in sustainability research (Dreborg, 1996), and which has also been applied to climate change adaptation (Beaulieu, Silva, & Plante, 2016). In envisioning ideal adaptation governance scenarios, participants were invited to elaborate on actor roles, necessary policy instruments, and challenges to these visions. A full summary of the workshops is available in Bednar, Raikes, & McBean (2018). The following sections outline key themes from the interviews and workshops as they relate to the research question on governance visions across scales.

4.5 Findings

4.5.1 Higher Order Views of Key Actor and Their Roles

Regarding their own preferred place in adaptation governance respondents from the federal and provincial governments identified roles that were mostly related to convening actors and sharing information, and, in the case of the federal government, providing funding and conducting research. Notably these are, in essence, the roles that higher order government’s in Canada have already taken on (Wellstead et al., 2016; Henstra, 2017). Through a variety of projects since the early 2000’s the Canadian federal government has already been active gathering large networks of actors from across sectors and orders of government (Wellstead, et al., 2016; Henstra, 2017). In fact, throughout the past decade, there has been a consistent convening approach at the core of Canadian federal programs such as the

Regional Adaptation Collaboratives (RACs) and the National Adaptation Platform (NAP), with a core ethos of collaborative engagement, consensus building, and a national dialogue. One federal respondent summarized the general view:

> *Its probably most efficient for the federal government to be a source of information for future climate scenarios for example, and maybe for the federal government to have sort of a coordinating role and sort of to bring actors together*

Most recently this convener role has advanced through an adaptation working group as part of the Pan-Canadian Climate Change Framework, a dialogue including all provinces and with a primary focus on cross county negotiation of a national mitigation strategy. The adaptation working group in the Pan-Canadian framework has also produced a report on priorities (Government of Canada, 2016) and fostered the formation of an expert national panel who produced a report on the status of metrics for measurement and success of adaptation in Canada (Environment and Climate Change Canada, 2018). Provinces have shared in the wider convening role either in partnership with the federal government, or in nationally funded, provincially led, regional programs operated between 2011 and 2016 under the titled Regional Adaptation Collaboratives (RAC). As with the convening role, higher order governments also self-identified as necessary funders and researchers of adaptation in Canada. Many of the respondents in higher order governments pointed to existing research and funding through the RACs or NAP, as well as federally provided infrastructure funding facilitated by the Federation of Canadian Municipalities (FCM) (an arms-length organization of the federal government), as examples of effective ongoing and preferred future roles of the federal government. On the research side, it was deemed largely a federal responsibility to create and proliferate national climate projections and downscaled products from global models. Like interview respondents, workshop attendees were in consensus that the national impact assessments were core federal responsibility and praised existing efforts undertaken by Natural Resources Canada (NRCAN) in both 2007 and 2014 (Lemmen et al., 2008; Warren & Lemmen, 2014). Provincially, these same funding and research roles were self-identified as well, with the distinction of provincial

government respondents identifying a need to research more place-specific impacts and vulnerabilities to corporate assets.

Regarding municipalities, practitioners from higher orders of government saw local governments as 'frontline responders' to climate impacts and the ideal scale at which to plan and implement specific adaptation strategies. The case made was by respondents that only municipal officials and actors were familiar enough with local impacts, vulnerabilities, and social characteristics to legitimately implement adaptation measures. In workshops, in the presence of local practitioners, provincial attendees were insistent that a 'paternalistic approach', was not idealized at the provincial scale. This is contextually important as in Canadian the relationship between local governments and the sub-national provincial governments has long been a source of contention (Young, 2012). Local governments in Canada are established via provincial constitution, have limited means to gather treasury and rely heavily on provincial direction and funding. At the same time local governments often wish to self-govern without provincial interference, causing a push-and-pull of reliance and self-governance (Sancton, 2011). Therefore, a 'hands-off' approach of higher order governments in Canada then may be rooted in this constitutional nuance.

Finally, local governments were also considered as key in translating national and regional agendas or programs into local programs attuned to the specific geography of the municipality. For some national respondents, local governments were also crucial in fostering awareness of adaptation amongst the public, as one federal respondent put it:

> *I think municipalities have a pretty big role to play on adaptation, in ensuring that what their doing in terms of running municipalities has a climate resilience element baked into the system and also to ensure that residents of their municipalities understand climate risk and have information that they can act on.*

In summary, higher order practitioners typically saw their roles as operating to facilitate implementation at the local scale through convening and information provision. In the perspective of higher order governments in Canada, they were the researchers, conveners

and funders of much adaptation research, with the local governments being the lead for implementation, local liaisons, and local stewardship of infrastructure. The prominent roles identified in both workshops and interviews by combined federal and provincial practitioners are presented in Table 4.2.

Table 4.2 Most recurring adaptation actor roles based on higher order government actor respondents

Local Governments	Provincial Governments	Federal Governments
Manage Infrastructure	Communicate with Local Governments	Provide Funding
Implement Adaptation	Share Climate Information	Convene Actors
Identify Risk	Identify Risk	Conduct Research
Identify Vulnerability	Build Awareness Amongst Municipalities	Communicate with Provinces
Communicate with the Public	Provide Planning Tools	Share Climate Information

4.5.2 Local Views of Key Actor and Their Roles

Reviewing the interview data from local respondents, they recognized higher order governments as having the same general roles such as convening and funding. However, there were some noteworthy distinctions. From the local level, the federal government was seen largely as a research and funding actor that was often too far removed from local conditions and practitioners to be involved with most ground level implementation. This meant that local governments saw the federal level as a research, information sharing, and funding actor. essentially in alignment with the actor roles outline by higher order governments. However, for local actors, the province, while having those same roles as the federal government, was seen as the preferred scale for convening actors because of its authority over municipalities. According to local practitioners, it is the provincial governments who ought to be the nexus of adaptation activity with role of arbitrating between information and strategies from the federal government and the interests and needs of local governments. This vision of sub-national prominence in adaptation governance has been identified in other research exploring local practitioner insights on adaptation (Dannevig & Aall, 2015).

In Ontario, this perspective developed parallel to dissatisfaction with provincial actions thus far. Most local respondents in the Ontario case felt that the provincial government had been largely absent in fulfilling its necessary roles of mediating between federal and local interests and communicating with local governments. As one local practitioner stated, regarding the provinces' potential role:

> *In my opinion, I think it should be leadership, and then determine how* [to adapt], *but then there is an enabling factor, absolutely, in terms of how they actually try to get information developed and communicated and implemented. But they need to have that leadership because they are at the right scale of governance, the province, for this kind of issue.*

Along with identifying the province as the ideal nexus of adaptation governance, the other noteworthy distinction in ideal actor roles provided by local respondents was that of setting guidelines and standards as a provincial responsibility.

In-line with the aforementioned discussion of local-provincial relations in Canada, because local governments are 'creatures of provincial stature', much of their policy capacity is limited as they are not self-chartered governments in their own right able to regulate in certain policy sectors. Because of this, local governments only have taxation and regulatory power over few areas and if they are interested in developing policy instruments in other areas often need to look for provincial support (Sancton, 2011). Even where local governments do have jurisdictional authority, they can be hesitant to act due to uncertainty or competing priorities and the interests of neighbouring jurisdictions (Measham et al., 2011). As one respondent put it, regarding the desire for provincial standard setting to promote adaptation:

> *A huge stumbling block to people actually doing stuff, is well there is no mandate, or you know people are saying, there's so much uncertainty around the climate models, or the flood models or the flood plane, so unless the higher order of*

governments set out a standard or a protocol, there is no way to compel people to do what they may know they need to do.

This notion of a desire for higher order governments to set out standards and to mandate adaptation action is discussed at length in the next sections as it related to a fundamental difference in perception of governance identified amongst the respondents on relations and policy instruments. Regarding self-identified roles, local respondents outlined preferences very similar to those of higher order governments and no major misalignment is evident, these include acting primarily as infrastructure managers and liaison to the public, as well as identifying local risk and vulnerability. A summary of local views of actor roles is presented in Table 4.3, with many of the same roles as Table 4.2, with the exception of "Set Guidelines and Standards" at the provincial scale.

Table 4.3 - Most recurring adaptation actor roles based on local government respondents

Local Governments	Provincial Governments	Federal Governments
Manage Infrastructure	Communicate with Local Governments	Provide Funding
Identify Risk	Set Guidelines and Standards	Convene Actors
Communicate with Public	Foster Coordination	Share Climate Information
Implement Adaptation	Provide Planning Tools	Conduct Research
Identify Vulnerability	Convene Actors	Communicate with Provinces

Overall, considering insights from both higher orders and local governments, when it comes to actor roles, few roles aside (provincial nexus and standard setting), there was little friction between federal, provincial, and local visions. However, the emphasis put on the provincial scale by local governments to mediate between federal and local scales, and provide adaptive mandates was notably absent from higher order perspectives of actor roles. The general agreement on other roles is likely a reflection of the long-established order of Canadian federalism on many policy issues, where convening, research, and

funding are common roles of higher orders, and implementation and stakeholder representation tend to come from municipalities (Black 1975; Young, 2012). The call for leadership and direction from the local government is also not novel to the Canadian context and permeates multiple policy issues (Young, 2012). Additionally, for some, the notion of local actors "blaming" higher orders for lack of direction is a common strand across the policy literature (Urwin & Jordin, 2008). This discussion will be returned to in the conclusion, but based on this data, with limited exception, it does not appear as if there is significant misalignment between orders of government, on the "who does what" question of adaptation governance. The following section, considers the "how" component of governance via actor relations and policy instruments.

4.5.3 Higher Order Views of Relations and Policy Instruments

When asked about their preferences regarding actor relations and policy instruments along the regulatory, market, or persuasive triad, we found that among respondents in both provincial and federal orders of government there is a decided lean towards collaborative partnerships and non-coercive relations in carrying out the roles discussed above. In reviewing the responses of federal and provincial practitioners, not only was there a strong commitment to the existing non-coercive order of current adaptation programs, but a specific disinterest in means of governance aligned with regulatory or legalistic approaches, specifically strict regulations in the case of the federal government and downwards mandates to municipalities in the case of provinces. Table 4.4 outlines the most common specific policy instruments discussed as deal by higher order governments.

Table 4.4 - Ideal adaptation policy instruments as identified by higher order government respondents

Specific Instrument	Type
Information Sharing	Persuasive
Impacts Consideration	Persuasive
Guidance and Best Practices	Persuasive
Tax Incentives	Market
Funding Availability	Market

Along with these identified instruments, respondents from provincial and federal government were also least likely to speak favourably of regulatory instruments or coercive relations in government-private sector relations. Some of the instruments presented can operate in either regulatory or persuasive form, such as climate impacts consideration, which could be mandated to industry or local governments or simply promoted. In the context of discussions with higher order governments, it was clear that there was little interest in impacts consideration being mandated. This was evidenced by respondents from both types of higher order practitioners referring to regulatory approaches as undesirable or unrealistic. As one federal official put it:

> *hmmm, regulation and legislation? I tend to personally shy away from just because I think that the approach to adaptation has been one that's very, it's a very voluntary, versus mandatory approach. A very collaborative, versus command and control approach.*

Comparing the two provinces, there was little distinction except for the recognition among practitioners in the Ontario case of some current hierarchical processes at municipal scales. This was due to municipalities undertaking regulatory action or a few provincial ministries promoting mandatory climate considerations. Specific instances of hierarchy discussed by higher order governments were Toronto's green standard and mandatory green roof program and a recent provincial memo requiring updates for intensity, duration, and frequency (IDF) precipitation calculations and projections for all future infrastructure proposals across the province. Despite these examples of regulatory use at the local scale often being phrased as success, regulatory mandates were generally seen by provincial respondents as unfeasible and politically unlikely when it came to adaptation given the overarching voluntary-collaborative approaches in operation. As one provincial respondent phrased it:

> *If the province just came in and imposed in kind of a paternalistic manner, yeah, I think that would be problematic and it wouldn't be as successful. It wouldn't have*

> *the same the efficacy that it otherwise could if the province and the municipality worked collaboratively on identifying the problem and formulating solutions*

Based on both the roles, relations and instruments described from the higher order respondents, federal and provincial governments have seemingly 'dug in' to a network mode of collaborative actor relations and persuasive policy instruments.

4.5.4 Local Views of Relations and Policy Instruments

When it came to the means of carrying out the identified roles via actor relations and policy instruments, a divergence in perspectives emerged in the data between local level practitioners and their higher order counterparts. The dominant theme from local respondents in this regard was hesitance towards continued (over)reliance on network logic. The dominant policy instrument discussed by local respondents was a need for standards and codes for adaptive actions as imposed by the provinces and federal government. Local actors spoke to these as necessary largely based on two fronts: to incentivize adaptation where there were laggards, and to provide targets to municipalities unclear on "what to aim for". On the former point, one local official noted:

> *There are all these action plans, and people wouldn't just ignore them right (*SARCASTIC*). It's a recommendation, you realize, nope, people do just ignore them cause its easier to ignore them or just give some lip-service. So, its almost like you need something, that is very basic, incentivizing it. You don't want to have people making plans for the sake of making plans, that's difficult too right, because then you have rooms full of great planning documents. Its more of, okay, if you accept that this is happening, how do you plan for the long term. The good news is that its happening over a long arc of time, so get ready for it. But yeah, I think sort of more the big picture, the feds would need to mandate something or, even, or you could mandate having a plan that would qualify for funding or something like that.*

Local respondents saw value in what was considered mostly untapped regulatory approaches from higher order governments in order to progress adaptation forward. This

concern was also linked to a critique that existing relations and roles were overly focused on negotiation and discussion at the expense of, to use Zehavi's (2012) terminology, 'harder' policy action. Reflecting on governance challenges in adaptation, one local practitioner provided this insight representative of the emergent theme that higher orders of government were continuously studying adaptation with hesitance to get started on the harder aspects if implementation:

> *We spent a lot of time planning, right, and you know,* [local program] *took us three years to develop, to do the plan, but now we are implementing, and I think that is part of the issue, is that, we gotta stop studying these things and start doing them. You know from a government point of view, its safer, its way safer, to examine, to study, to plan, then it is to actually do, right? And I think we need to get over that hurdle and start putting projects in place, start building things. And its not like you don't know what to do, you don't have to look at the tens of reports, they're just copy and paste by now, you know.*

Ultimately when it came to desired instruments, the responses from local level practitioners were that *"voluntary is not enough"*. Interestingly, one means of enforcing adaptation downwards, that of 'mandatory consideration' was a common topic of discussion amongst local level governments. As discussed above, while provincial and federal respondents spoke to 'mandatory consideration' as one of their stronger outcomes from the governance process, local practitioners perceived it slightly differently. Local respondents applauded the use of climate lensing and requirements (mandatory consideration) but were skeptical of them in the absence of stringent requirements. These concerns usually led to discussion of 'checkbox' requirements as "lip service" in that funding proposals or local plans simply needed to 'check the adaptation box' to satisfy provincial or federal funding or guidelines. As one local respondent put it when discussing land use changes that claimed to have a climate lens:

> *Its not structured enough, its doesn't direct them to take specific action, it just leaves it so open ended that people can tick the box by doing a lot of vague analysis*

> *if any. Usually GHG* [green house gas emissions], *if that's in there, then a lot of people say we're done now, and they completely ignore the adaptation side. I think that's definitely gotta change.*

As discussed in the literature review, other research on adaptation governance across scales has found that higher order government support can address scenarios where adaptation is outcompeted by other local interests (Amundsen et al., 2010; Juhola & Westerhoff, 2011). In our project a number of local practitioners noted this, as one respondent put it:

> *"I think its really hard to be successful on the voluntary front, but if there was more of a united front on the regulatory approach, again, because the municipality themselves will only put in regulation as long as it doesn't compete with a lot of their other interest, given that they are all pretty much broke, you know if the province doesn't do something uniformly its very hard to expect a voluntary mandatory approach* [from municipalities], *so again I think higher orders of government need to be a little tougher on regulation."*

Table 4.5 outlines the most commonly discussed specific instruments by local respondents. In these local responses, regulatory instruments are more present compared to those of federal/provincial order instrument preferences (Table 4.4). The table also reflects that local practitioners were much more diverse in their discussion of policy instruments across the triad, even through they were fewer in number.

Table 4.5 – Ideal adaptation policy instruments as identified by local government respondents

Specific Instrument	Type
Standards and Codes	Regulatory
Mandatory Impact Consideration	Regulatory
Information Sharing	Persuasive
Tied Funding	Market
Guidance and Best Practices	Persuasive

The interview data also allowed for coding of preferences and disinterest in policy instruments because discussions of governance features were coded for 'current', 'desired',

and ‘undesired’. When comparing perspectives on broad policy instrument types across orders of government, in reference to whether they are current, desired and undesired, responses from local practitioners align in an almost reverse fashion from those of higher order governments (Table 4.6). In this data set then, moving downwards from the national to sub-national to local scales of governance there was more desire for use of policy instruments other than the persuasive variety and an overall willingness to move away from network governance, or balance it with other modes.

Table 4.6 – Most common policy instrument types by current, desired, and undesired and by order of government

	Current	Desired	Undesired
Federal	Persuasive	Persuasive	Regulatory
Provincial	Persuasive	Persuasive	Regulatory
Local	Persuasive	Regulatory	Persuasive

However, local practitioners were not discounting all value of existing modes of governance operationalized at provincial and federal scales. Local respondents did note the value of connectedness between practitioners across the country when facilitated by federal adaptation programs. In defence of the collaborative approach, most respondents recognized that given the long-standing challenge of interdepartmental coordination, network approaches internal to orders of government (within provinces and between ministries) were highly valuable, as collaboration and partnerships are necessary given that few ministries in the Canadian system have directive power over others. More accurately, it should be stated then that local practitioners were arguing for a stronger influence of hierarchical (or even market) governance rather than a wholesale shift to command and control policy making. Based a combination of preferred actor roles and policy instruments the overall governance mode as identified as current, desired and undesired amongst respondent types is plotted in Table 4.7, representing the overall governance gap between local and higher order perspectives.

Table 4.7 - Dominant governance modes most commonly identified in interview respondent data from practitioners at each order of government

	Current	Desired	Undesired
Federal	Network	Network	Hierarchy
Provincial	Network	Network	Hierarchy
Municipal	Network	Hierarchy	Network

While general actor roles did not vary drastically between local and higher order respondents (despite local calls for provincial standard setting), there was considerable misalignment when it came to actor relations and policy instruments and therefore broader adaptation governance. Both types of actors identified that the existing roles and relations related to convening were effective to an extent, but there was a decided interest in more downwards mandating, standard setting, and regulation from provincial governments amongst local adaptation practitioners. Overall, respondents from higher order governments favoured network governance, while local respondents spoke to a more diverse mix of modes and were, at times, critical of the network approach. The following section considers these findings in relation to the literature discussed above and their ramifications for any ongoing or future efforts to intervene and successfully steer or design adaptation governance.

4.6 Discussion

The perception of what appropriate adaptation looks like affects how adaptation will be governed. Like problem definitions (Juhola et al., 2011), governance characteristics (appropriate actor relations and instruments) matter too. And, just as the alignment of adaptation problem definition is essential to a coordination multilevel approach, visions of governance, are equally crucial. While we recognize that many governance features are outside the control of government employees, the indicated preference, willingness to explore alternatives, and normalization of different governance arrangements are within the realm of daily practitioner lives. Like policy instruments, we contend that additional governance features such as actor roles and relations between local and higher order

governments also involve *"choices about whether and how state authority and resources should be mobilized to address a problem"* (Henstra, 2015, 498).

In our case, we contend that a similar construction of adaptation and its appropriate responses is taking place in regard to governance arrangements. As our data, and others have shown, adaptation is overwhelmingly conceived as a multi-actor problem requiring network logic. What is too often left out of this construction are the limitations of these polyarchic governance arrangements and the need for additional components from other modes to compliment them, (Torfing, 2012) especially in the case of addressing cross-scale coordination. If one order of government continues in a governance mode influenced by network logic, while others suggest a need for other modes, adaptation will stagnate, as with other issues of misalignment (problem definition, adaptation priorities, concept of mainstreaming),

Respondents in our study effectively pointed out that adaptation governance, as it is currently conceived by higher order governments, is a problem seen to be addressed via voluntary, persuasive, instruments and relations in wide-ranging multi actor landscapes. Having seen the limited progress fostered by this framing, local actors were prone to suggesting components of alternative governance modes to address the types of governance barriers recognized in their work and consistent with the global adaptation literature discussed earlier (Amundsen, 2010; Juhola & Westerhoff, 2011; Measham et al., 2011; Bauer & Steurer, 2014, Oulahen et al, 2018). From our perspective this reveals that other issues of misalignment that have led to discussion of 'governance barriers' may be rested on distinct visions of what is the appropriate mode of governance for various adaptation efforts.

As Juhola et al. (2011, 460) concluded in their analysis of competing framings of adaptation: *"different initial framings of adaptation result in a particular definitional of the problem, and consequently lead to particular policy solutions whilst excluding others".* Aligned with Juhola et al. (2011), we argue that an *a priori* assumption of network logic

effectiveness at higher order governments is, perhaps ironically, limiting the effectives of coordinated adaptation governance in multilevel systems.

Other recent studies have also identified similar trends to our findings, though without explicit engagement of competing governance theories. For example, the aforementioned work of Waters & Barnett (2018) found a distinct preference for more hierarchically influenced governance of adaptation amongst the Australian public. As Waters & Barnett 2018, 720) conclude in the Australian context:

> *The broader trend towards 'enterprise governance' where authority is devolved to lower levels and shared with non-government actors is not one that is supported in the imagined regimes of non-experts.*

Similarly, Oulahen et al. (2018) identified that amongst local practitioners in British Columbia, respondents cited the need for a stronger regulatory framework from provincial and federal governments. Based on some of this emerging literature, it is possible there is a germinating interest to reorder much of the dominant network order of adaptation governance in developed multilevel systems. The novelty in our findings is the empirical identification of an apparent governance gap between local and higher orders of government when it comes to actor relations and policy instruments, or, the 'how' of adaptation governance across orders of government.

4.7 Summary & Conclusion

Our analysis shows that in engaging the question of adaptation governance across three orders of government, practitioners reveal both alignment and misalignment. We found that practitioners from all orders of government in Canada generally agreed on the roles of each order of government throughout the adaptation cycle. In this relative consensus, the federal government is seen largely as a research institution and funder of lower order activities. This is not only aligned with constitutional divisions, but, for the most part, the pre-existing activities of the federal government. While the same agreement and alignment with expected roles was found regarding provincial governments, a significant preferred

provincial role identified by local practitioners was also that of coordinator and standards setter. Finally, within this consensus on actor roles, local governments were identified by both themselves and higher order governments as primary infrastructure managers, adaptation implementers, community liaisons, and identifiers of risk and vulnerability.

In contrast, the more revelatory finding of our analysis relates to preferred governance modes via actor relations and instrument selection and a misalignment between how higher orders envision effective governance of climate change adaptation versus those at the local scale. While local practitioners do not want to discard all network components (cross-sector convening, plurality of inputs, access to non-governmental actors), they did provide a clear vision for the infusion of hierarchical logic into adaptation governance and reduction of network reliance. As discussed this was most evident as being desired in relations where there is authoritative capacity and where action may not occur in its absence, such as between provincial and municipal laggards, or where other local interests would outcompete adaptation. As has long been the mantra in the governance literature, it is ultimately the mix that matters (Rhodes, 1997; Meuleman, 2008). Regarding the prominence of network governance in adaptation, as Torfing (2012, 107) puts it: "networks should not be left to drift and possibly fail". Our findings indicate that local government respondents have identified this and see changing cross-scale relations as means to advance adaptation.

Future research should recognize that 'governance barriers', in the case of local and sub-national or national misalignment, are not solely procedural or organizational in nature, but ideological and rested on views of governance appropriateness across scales. Our findings then reveal that the governance barriers identified in much adaptation research should not be separated from visions of how adaptation *should* be governed. Our study has contributed to the further examination of recognized governance barriers of cross scale interaction and argued that for them to be thoroughly addressed and overcome, research needs to avoid the black boxing of governance (Wellstead et al., 2013) and put actor roles, actor relations, and policy instruments in direct sight of empirical multi-level research.

The misalignment we found between local and higher order governments indicates that networks alone cannot address the existing 'governance barriers' of adaptation, and that governance alignment, regarding dominant modes, requires more consideration. Future research will need to further test whether governance visions differ across scales in other multilevel systems, as it is possible that the historical provincial-municipal relations in Canada are unique. Future research could also identify more explicitly whether higher order governments (or any governments) are indeed adverse to hierarchical, command and control government, for climate change adaptation, and if this is linked to the inherent uncertainty of the problem as often cited (Frohlich & Knieling, 2013) or, as suggested by others (Sorensen & Torfing, 2009), a broader, ongoing turn away from governing by government in the neoliberal era.

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Chapter 5

5 Conclusion

The preceding chapters have outlined the context and development of the project, addressed the major research questions, and provided empirical insights and novel contributions to the study of climate change adaptation and its governance. This chapter concludes the thesis with a review of the project's academic and practical contributions to the Canadian and global scholarship on adaptation and governance, a series of policy recommendations, a discussion of the study's limitations, and directions for future research.

5.1 Contributions of the Study

5.1.1 Applying a Typology of Governance

This study has contributed to the field of adaptation governance based on the findings presented in each paper. In addressing Research Question 1 (can an established governance theory framework offer clarity in conceptualizing adaptation governance?), conceptual clarity has been provided regarding adaptation governance by bridging the vast theoretical work in public governance with adaptation research via empirical examples. The timeliness of the governance framework's application to adaptation can be identified through review of the recommendations of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (2014). The IPCC, in its adaptation chapters highlights the need to better understand the linkages between orders of government and forms of relations (coercive, collaborative, negotiate). Speaking to governance, Noble & Huq (2014, 836) highlight that while local governments are the primary implementers of 'on the ground' adaptation work, their work must be coordinated during both the "*top-down flow of risk information*" from larger institutions, and "*scaling up the bottom-up efforts of communities and households*" at the local scale.

It is argued that this project also offers theoretical insights of value in response to the emerging and continued importance of governance in adaptation. This importance was

noted by Huitema et al., 2016, 13) in their introduction to a special journal issue on adaptation governance, when they summarized the immediate research agenda on the topic as:

> *Governors in the climate adaptation domain need to define the problems they face, choose at what jurisdictional level action will be undertaken, decide when action will be taken and through which modes of governance and instruments. Furthermore, they need to decide which normative principles will be guiding them and how implementation and enforcement will be arranged.*

The research presented in Chapter 2 provides a concrete means to characterise ongoing climate change adaptation in academically rigorous and meaningful ways. As seen in both Chapters 2 and 3, local governments are taking various approaches to adaptation and practitioners at these scales see particular policy instruments (regulation and market incentivization) as necessary next steps in facilitating implementation. As discussed, the 'implementation deficit', or the current gridlock of action discussed by the IPCC, is unlikely to be overcome if governance applications and preferences are not aligned between orders of government, or, at least, identified. Additionally, this project's engagement with adaptation policies as theories of governance works to both broaden the theoretical gaze of the literature (by bringing in the other modes) and remove the depoliticized lens (black boxing) of governance in most adaptation research (Wellstead et al., 2013; Eriksen et al, 2015).

As the adaptation literature moves towards addressing implementation and assessment (United Nations, 2017), the work of identifying and comparing governance modes across scales and sites will provide increased understanding of effective, or appropriate adaptation governance. As discussed in Chapter 2, using an established framework of governance approaches may be increasingly useful as more mature adaptation policies emerge. As practice and literature turns to the later stages of the adaptation cycle, success and failures can be further assessed for the actor roles, actor relationships, and implemented policy instruments that accompanied them. This will allow for assessment of governance mode

appropriateness for various sub-issues of adaptation (such as different stages, sectors, scales, or frames), as well as comparison, or transfer, to other sites, as empirical observations increase.

For example, as adaptation assessment methods improve, recognizing success and their accompanying governance characteristics will indicate that the same, or similar, governance arrangements, may need to be in place, and be politically supported/accepted as legitimate, in any locale looking to replicate the initiative in question. Research Question 1 and its answer then are considered responses to the adaptation literature's call for direct engagement and conceptualization with adaptation governance (Wellstead et al., 2013, Huitema et al., 2016; Henstra, 2017) and the need for increased means to compare distinct objects of study and contrast adaptation across cases and jurisdictions (Smit et al., 1999; Dupuis & Biesbroek, 2013; Vink et al., 2013; Vogel & Henstra, 2015).

5.1.2 Characterizing Current Adaptation Governance

The thesis also contributes to understanding of adaptation governance through in-depth empirical analysis by answering research questions 2 (What are the current modes of adaptation governance in Canada?). As shown in Chapter 3, a multi-level analysis of current governance processes reveals an identifiable dominance of network governance in Canada around adaptation. While the idea that adaptation is governed largely by network features is not entirely novel, its empirical identification based on explicit features and a theoretical framework add clarity to the description in robust manner not previously done. The study also confirms the assumptions of many studies which identified network governance through secondary analysis (document review) or analysis of single scale of governance (Mees et al. 2014).

The clear indication of network dominance based on empirically identifiable governance features of actor roles, actor relations, and policy instrument use, fits directly into calls for the next necessary steps of adaptation research per the IPCC. In their chapter on Adaptation

Planning and Implementation for the AR5, lead authors Mimura & Pulwarty (2014, 871) concluded:

> *Linkages with national and sub-national levels of government, as well as the collaboration and participation of a broad range of stakeholders are important. Steps for mainstreaming adaptation have been identified but challenges remain in their operationalization within the current structures or operational cultures f national, subnational, and local agencies.*

It is precisely these 'operational cultures' that the discussion of current and preferred modes of governance identified in this study reveal. Moving forward to address this, practitioners and officials will need to recognize that other orders of government, or other actors in the policy landscape (whether networked or not) may not share in their perception of how adaptation *ought* to be governed. In the case of Canada, and the provinces of Manitoba and Ontario, local actors, or others interested in advancing adaptation implementation, need to recognize the overarching logic of networks at play. This does not mean recognizing only that actors are networked in a literal sense, but that a preference for non-coercive, voluntary, soft policy tools prevails in most sectors, especially at provincial and federal scales. In the global context, this may vary, as Hong Phuong (2018) notes in the Vietnam context, there are national policy landscapes more prone to hierarchical modes. In either case, adaptation actors need to be aware of the primary logics and mechanisms of the dominant mode of governance and recognize its strengths and weaknesses.

Retuning to the case studies in Chapter 3, the identification and description of dominant network processes allows for theory building between the empirical observation and existing governance literature. The analysis provided both the network characterization as well as confirmation of a pronounced implementation deficit consistent with the international literature (Mimura et al., 2014) and recent Canadian assessments (Auditor General of Canada, 2017; Auditor General of Canada 2018). While discussion of adaptation deficits has been engaged in the literature (Burton, 2006; Dupuis & Biesbroek, 2013; Dupuis & Knoepful, 2013, Mimura et al., 2014), it has not been directly linked to

empirical observations of governance arrangements or governance theory. This project was able to identify how the notion of the implementation deficit, especially as described by respondents, is consistent with known limitations of the identified network governance in place and the concept of network failure.

For the governance literature, this study provides a strong empirical example of governance failure, and more specifically network failure (or its limitations) as discussed by Thompson (2003), Borzel, (2011) and Hall (2011). Ultimately this suggest that governments, and other actors, have perhaps relied too strongly on network logic. While the value of network governance is understood, and appropriate for many of the wicked problems of climate change adaptation, the weaknesses of networks may be equally problematic as they can be ineffective if not adequately steered (Rhodes, 1997). This finding indicates that in addressing the implementation deficit, governments, the only actor with legitimate authority to do so, likely need to actively steer networks more deliberately and be willing to 'get political' on adaptation.

5.1.3 Adaptation Governance Alignment and Practitioner Visions

As discussed in Chapter 4, studies of existing adaptation governance have focused much attention on the relations between local and higher order governments (Amundsen et al., 20100; Measham et al., 2011; Juhola et al. 2011). In exploring the higher-order-local governmental relations on the governance context, this thesis project revealed that there are indeed differing visions of adaptation governance between local and higher order government practitioners in Canada. Notably, local government respondents presented critiques of the network processes conducted by provincial and federal scales while highlighting hierarchical and market approaches in local governments as instances of success. In identifying how adaptation practitioners felt the issue ought to be governed, the distinction was clear, not only in preferred visions, but also in governance features that were *undesired*.

Chapter 4 highlighted two emerging streams in the adaptation literature: the turn towards research on how adaptation *ought* to be governed, and a challenge to the dominant network mode of governance. Regarding the first, this study was novel in its direct engagement of policy preferences among adaptation practitioners. As mentioned in earlier chapters, only the studies of Otto-Banaszak et al. (2011) as well as Waters and Barnett (2018) can be identified as empirical case studies probing the nature of preferred adaptation policy/governance across a population (various experts and the public respectively). This study's contribution was to elaborate these preferences with two novel explicit goals. First, to categorize the preferences onto an established framework of competing governance modes, and second, to compare the preferences between orders of government.

The results of this second element relates to the other emerging component in adaptation research, that, as one of this study's participants put it, "voluntary is not enough". More accurately, this could be called "network fatigue" in which practitioners closest to climate change adaptation initiatives recognize the limit of the modern dominance of network modes in the neoliberal era. One of the reasons this 'network fatigue' is underdiscussed in the adaptation literature is likely, as discussed above, the absence of explicit characterization of adaptation governance as network dominated in comparison to other modes of governance. While research on adaptation governance generally acknowledges the dominance of polycentric governance arrangements, and sometimes the phrase network is used (Amundsen et al., 2010; Mees et al., 2014), this scenario is rarely contrasted to governance alternatives which has led to a sense of inevitability that adaptation must be governed through large, intersecting networks of actors in non-coercive relations with the higher orders of state as conveners only.

The central contribution of Chapter 4 lies in the comparison of governance preferences between local and higher orders. This points to additional issues of concern for policy interplay between local and higher order governments that have been addressed in past literature (Urwin & Jordan, 2008). As discussed in Chapter 4, the competing visions of governance arrangements, notably in actor relations and instrument selection, suggest that

circumstances, and the very real impacts of climate change, may be pushing local governments away from entirely networked approaches to adaptation in favour of "stronger" approaches (Zehavi, 2012). Ultimately this contributes to expanding insights into competing visions of adaptation governance across scales or sectors (Otto-Banaszak et al. 2011; Waters & Barnett, 2018) and the endeavour to foster better alignment of local and higher order adaptation approaches (Noble et al., 2014). It is argued, like so many other aspects of adaptation (Juhola et al., 2011), the framing of what is *appropriate* governance matters in regards to making progress on adaptation; especially given the necessary cross-scale interactions in multilevel federal systems.

5.2 Policy Recommendations

Recognizing the more academic and theoretical contributions of Chapters 2, 3, and 4, this section presents more practical recommendations with respect to the adaptation policy. This section aggregates the information from all respondents gained through interviews, expert workshops, and researcher insights with the objective of answering the question "who should do what and how?" regarding adaptation in Canada (according to expert adaptation practitioners); this section is presented as a direct response, then, to that question. The recommendations are based on information from interview respondents, though, because this section is designed for direct release to research participants and non-academic colleagues, there is some repetition with previous discussions.

Section 5.4.1 presents preferred actor roles in Canada from the respondent data and then places ideal government roles along the stages of adaptation. Section 5.4.2 turns to suggestions regarding governance modes and provides an idealized version of how each mode might address adaptation stages. Section 5.4.2 also plots governance modes along the adaptation cycle in order of preference based on a review of the interview data. To aid in summarizing the entirety of lessons learned during the project, numerical queries were run on all the interview data and all codes in NVivo to identify the presence of themes which emerged throughout the research. In line with qualitative methodology, the number of mentions are not taken as definitive reflections of theme-importance but instead as

guidance in discerning key themes (Sandelowski 2001; Cope 2016). The reason for this is the difficulty, or impossibility of applying quantitative standards to data collected through qualitative epistemology, in short, as is common in qualitative methods, the data was not collected in a fashion that allows for simple transition to quantification (Guba & Lincoln, 2004). Below, Figure 7 provides a screenshot example of NVivo and its numerical querying of codes, and cross referencing. In the example presented, all actor roles coded were cross referenced with all named actors, within all interview files (in the left side of the image, under "Query Results", some of the other numerical queries that were run can be seen). The following Section discusses policy recommendations for actor roles in Canadian adaptation governance.

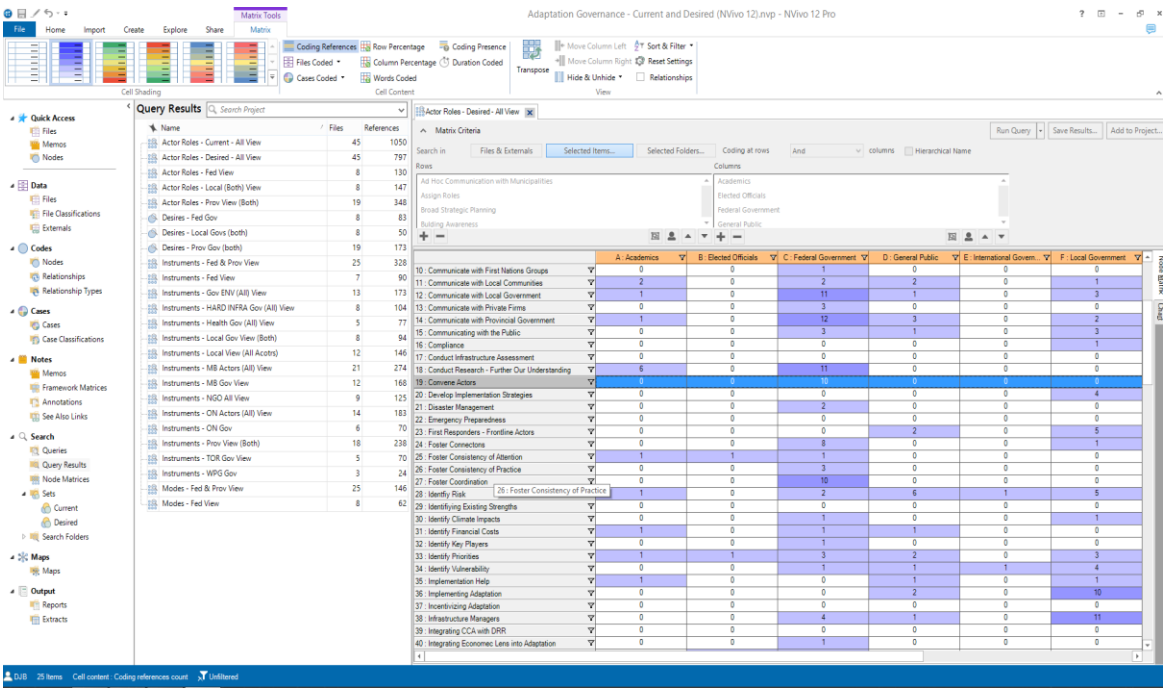

Figure 7 - Example of NVivo numerical queries

5.2.1 Recommendations on Actor Roles for Climate Change Adaptation Governance in Canada

This study found that the overall division of responsibility in Canada is generally accepted, with roles fitting those already in processes and aligned with constitutional order. Table

5.1. presents the most-commonly discussed ideal roles for each level of government, as well as NGO, the private sector. and the general pubic, according to the respondents interviewed for the project. As can be seen, each actor has distinct "ideal" roles for other actors, but none that were overtly contrary to constitutional divisions of labour. This suggests that in envisioning effective adaptation governance in Canada, the nearly 100 expert practitioners, who contributed to the study, did not envision a scenario that would require transformation of existing constitutional order.

Table 5.1 - Preferred actor in Canada for climate change adaptation according to all respondent data (in order of mentions).

Federal Government	Provincial Government	Local Government	NGO and Research Organizations	Private Sector	Public
Provide Funding	Communicate with Municipalities	Manage Infrastructure	Convene Actors	Identify Risk	Identify Risk
Share Climate Information	Set Guidelines and Standards	Implement Adaptation	Share Climate Information	Provide Leadership	Communicate Climate Risk
Provide Leadership	Provide Planning Tools	Identify Risk	Communicate with Local Government	Provide Multiple Perspectives	Champion Adaptation
Set Guidelines and Standards	Foster Coordination	Develop Implementation Strategies	Conduct Research	Manage Infrastructure	Implement Adaptation
Provide Data Products	Share Climate Information	Identify Vulnerability	Foster Connections	Conduct Research	Build Personal Capacity

The roles presented in Table 5.1 were not established before the interviews and therefore come directly from respondents. The only changes made to them was that similar responses were aggregated (for example roles of "should carry out climate research" and "should expand our knowledge of impacts" were combined due to similarity). As a result, the roles are partially vague in title as a 'reasonable' number of labels was sought to make analysis possible (Cope, 2016). However, regarding the broader context of their use, nuances can be identified through familiarity with the interview transcripts. For example, it was well accepted by all respondents that it was the role of the federal and provincial government to

provide guidelines and set standards (for lower orders of government in the case of provinces). And while this has occurred in numerous instances through Natural Resource Canada's Regional Adaptation Collaboratives and National Adaptation Platform (NAP), the degree to which such guidance and standards were mandatory or persuasive is where this role became contentious.

As discussed in the thesis, analysis revealed that respondents from local governments and non-governmental actors were more likely to relay preferences for stronger guidelines and the use of regulatory capacity (where available) to enforce them. Conversely, responses from higher order respondents pointed to the persuasive guidelines provided in land-use planning and agriculture, among other areas, as examples of setting guidelines and standards. The point of contention on this role then is whether adaptation guidelines should be mandatory or voluntary. According to many respondents however, for adaptation to progress in Canada, higher order governments will need to explore the notion of stronger guidelines and standards and work with local governments to find agreeable alternative governance arrangements to address the perceived 'softness' of existing efforts.

Also noteworthy in Table 5.1 is the number of key roles identified by respondents for NGOs and research organizations. Commonly discussed organizations of this nature included: the International Institute for Sustainable Development (IISD), International Council for Local Environmental Initiatives (ICLEI), the Ontario Centre for Climate Impacts and Adaptation Research (OCCIAR) and the Government of Quebec funded *Ouranos*. As identified, these organizations were highlighted as necessary convenors to create spaces for sharing of climate information and adaption experiences amongst actors. Respondents noted that these research organizations often acted to provide these roles in a stable continuity, especially when changes in government led to a decline in interest on climate change politically. Research organizations as a whole were seen as valuable conveners because they can act as 'boundary organizations' between government, industry, and academia without the limitations of each of those sectors' internal "silos" or "echo chambers". In general, it was the flexibility and 'third-party' nature of NGO and research

organizations that was identified as crucial contributions to adaptation governance. As one government respondent noted:

> *I find they have latitude, they have the ability to reach out to people because they are not restricted by the government's role, which is very valuable. They have a much more flexible role and they can reach out and connect with people on many levels and so its very valuable to have them. Also, I have been finding they have been able to maintain that core of expertise and a focal point over time, it's something they have planned to do, so ICLEI* (International Council for Local Environmental Initiatives) *and OCCIAR* (Ontario Centre for Climate Impacts and Adaptation Resources) *have been a focal point for people to go for information. Having that continuity is very important, because having to chase down people to get an answer is actually gonna stop people from finding that answer. So, the more connections, the more places we have that provide that background that backbone is very useful.*

To clarify how the roles in Table 5.1 may look in practice, it is useful to plot them along the adaptation cycle of (1) impact identification, (2) risk and vulnerability assessment, (3) adaptive measure and policy instrument deliberation, (4) implementation, and (5) monitoring and assessment (ICLEI, 2012). Table 5.2 does so for each order of government and represents an amalgamation of the roles provided by interview respondents as well as workshop participants.

As can be seen in Table 5.2, the province carries a significant number of important roles which reveals the need for provincial scales to be the nexus of adaptation governance in Canada, balancing the direction of national strategies with the interest of local governments. Further provinces need to be primary information brokers, (likely in partnership with NGO and research organizations) for communicating the provincial relevance of national impact projections and funding internal and external research to develop regional and downscaled climate projections. This central role for provinces is fitting with existing constitutional order as provinces maintain sole jurisdiction over municipal affairs (as federal-municipal relations are sometimes limited). While provinces alone cannot foster adaptation uptake, lack of provincial action to convene, communicate, and coordinate (regardless of instruments) is likely to lead to significant stagnation. This

model then requires that the provincial government be a consistent presence throughout all adaptation processes.

Finally, as was evident through workshops, adaptation experts highlighted that all governments have a fundamental responsibility to assess their crown/corporate assets and services for vulnerability to climate impacts. Regardless of external modes of governance for interactions with other orders of government or the private sector, it was evident in the research that a fundamental starting point is for governments to be adapting internally. This was also a core consideration of the recent report from the Office of the Auditor General of Canada which concluded that the federal government, and provincial counterparts were generally ill prepared for impacts to their own assets and services, with only pockets of exceptions (Auditor General of Canada, 2017; Auditor General of Canada, 2018).

Table 5.2 – Recommended priority government roles by adaptation stage

	Municipal Governments	Provincial Governments	Federal Government
Stage 1: Impact Identification	- Identify impacts as experienced by local stakeholders and industry - Communicate local impact history to researchers and regional/provincial planners - Communicate local and regional impacts to community	- Convene local/provincial researchers and industry to downscale regional projections to provincial scale - Share climate impact information with municipalities - Identify impacts on regional scale affecting industry and economy	- Carry out research on impacts at the national scale - Downscale global models to the national/regional scale - Provide and heavily promote national impacts catalogue - Communicate the national and international urgency to adapt
Stage 2: Risk & Vulnerability Assessment Analysis	- Conduct vulnerability assessments for corporate and private assets - Act as local stakeholder liaison - Act as liaison for local private sector interests in provincial and national adaptation strategies	- Assess vulnerability of government assets - Conduct large-scale risks assessments for regional features such as ecosystems, watersheds, natural resources, and transportation networks - Foster means for rural and remote stakeholder representation - Communicate with industry and regional economic interests - Advocate the necessity of adaptation to municipal governments - Provide vulnerability assessment tools for municipalities - Provide funding for local assessments	- Assess vulnerability of crown assets - Communicate national risks assessments - identify risks relevant to international affairs - Communicate national risk to international community - Provide funding for regional, provincial, and local assessments
Stage 3: Adaptive Measures and Instrument Deliberation	- Identify adaptive measures relevant to local risks and vulnerabilities - Consider effectiveness and legitimacy of available policy instruments (regulatory, market, persuasion) for each measure - Represent local government interests in adaptive measures and instrument selection - Represent local stakeholders interest in adaptive measure and instrument selection,	- Develop and communicate provincial wide strategy for adaptive measures and support for accompanying policy instruments - Establish baselines and standards where deemed necessary - Provide metrics and monitoring tools for relevant adaptation measures and relevant policy instrument - Steer inter-municipal relations with focus on coordination and connectedness of efforts across scales and sectors - Provide tools for adaptive measure selection and policy instrument choice for local governments	- Provide and communicate national adaptation strategy or standards - Establish national guidelines and standards where necessary - Communicate international expectations and commitments as necessary considerations of regional or local plans - Provide supplementary decision making tools or insights for provinces and municipal governments - Provide user friendly and accessible data products to aid in adaptive measure and instrument selection
Stage 4: Implementation	- Mainstream adaptation across corporate functions - Implement adaptive measures in both public and private spheres through mixed-use of policy triad - Update infrastructure management to account for climate impacts;	- Mainstreaming adaptation across ministries, implement adaptation programs where jurisdictionally appropriate - Update infrastructure management to account for climate impacts;	- Mainstream adaptation across ministries - Provide political support for local and provincial measures and instruments - Implement national measures and instruments where necessary
Stage 5: Monitoring and Assessment	- Monitor adaptation efforts for effectiveness based on identifiable, and regionally standardized metrics; collecting feedback on adaptation measures and instruments from local stakeholders; - Conduct internal reviews of mainstreaming efforts and corporate adaptation; Enforce compliance of private and public actors where jurisdictionally appropriate	- Monitor adaptation with specific focus on province-wide coordination of municipal efforts - Carrey out regular reviews of assessment and progress based on evidence-based metrics; Aid municipalities with assessing adaptation success by providing assessment tools and metrics - Convene municipalities to discuss challenges and success - Enforce compliance of private and public actors where jurisdictionally appropriate - Conduct internal reviews of mainstreaming efforts and government adaptation	- Foster coordination between provinces with national and international objectives in mind - Convene high-level national meetings on progress - Monitor and arbitrate concerns of cross jurisdictional disputes or maladaptation - Enforce compliance where jurisdictionally appropriate - Conduct international reviews of mainstreaming efforts and crown adaptation

5.2.2 Recommendations on Modes of Governance for Climate Change Adaptation in Canada

To provide recommendations for governance modes and adaptation this section reiterates how each major mode would approach adaptation based on its internal logic then orders these approaches based on insights gained from the project. For each stage of the adaptation cycle, the preferred modes are ordered based on how prominently they were discussed by respondents throughout the research project. What emerges is a sort of 'hierarchy sandwich', where network governance acts as the bread and is prominent in early and later stages and hierarchy established in the middle (as the lettuce). Table 5.3 outlines how each idealized mode of governance would move through the adaptation cycle.

Table 5.3 -The adaptation cycle and the approach of each idealized mode of governance

	Stage of Adaptation				
	Impact Identification	**Risk Analysis**	**Instrument Deliberation**	**Implementation**	**Review and Assessment**
Hierarchy	Use of state science structure, state-driven prioritization of outcomes, citizen representation and consultation	Analysis of risk to state structures and services, measurable impacts, calculated outcomes	Use of Regulation or market intervention to meet state policy goals.	Jurisdictional-wide adaptation programs. Use of command-based policy instruments to achieve top priority goals	Internal assessment of policy outcomes, infrastructure assessment, service reviews, internal reviews on measurable outcomes
Market	Measurement of financial costs of climate events in both public and private sectors	Financial lensing of impacts and economic vulnerability of public and private sectors	Supply and demand projections, adaptive measure and instrument cost-benefit analysis	Laissez-faire or implementation of market Interventions to facilitate adaptive behaviour	Assessment of costs and savings
Network	Polycentric data gathering, expertise sharing, Mutli-actor insights, consensus building	Stakeholder input on risk and vulnerability, outside expertise for risk identification and calculation	Consideration of all network actors perspectives and interests, consensus and persuasion through non-coercive means	Promotion of adaptation initiatives though cooperative collaboration and public-private partnerships	Multi-stakeholder review of policy processes and outcomes, bargaining for changes based on public-private engagement and third party assessments
Community	Collection of local knowledge and expertise	Collection of local knowledge and expertise	Open public deliberation among community members, local assessment of adaptive efforts and expectation of civic engagement.	Civic engagement, voluntary community programs	Local input on success and failures, community insights

Each mode of governance approaches the coordination of social issues through competing, but internally consistent, means. Each mode also has strengths and weaknesses and can encounter governance failure in which the intended outcomes of social coordination are not met, and policy issues are not addressed (or new problems are caused). Table 5.4 presents the approaches of each mode of governance in the order of prevalence in the research project's data.

Table 5.4 – Recommended governance mode influence per adaptation stage

	Stage of Adaptation				
	Impact Identification	**Risk Analysis**	**Instrument Deliberation**	**Implementation**	**Review and Assessment**
Most Prefered	**Network:** Polycentric data gathering, expertise sharing, Mutli-actor insights, consensus building	**Hierarchy:** Analysis of risk to state structures and services, measurable impacts, calculated outcomes	**Hierarchy:** Use of Regulation or market intervention to meet state policy goals.	**Hierarchy:** Jurisdictional-wide adaptation programs. Use of command-based policy instruments to achieve top priority goals	**Network:** Multi-stakeholder review of policy processes and outcomes, bargaining for changes based on public-private engagement and third party assessments
	Hierarchy: Use of state science structure, state-driven prioritization of outcomes, citizen representation and consultation.	**Network:** Stakeholder input on risk and vulnerability, outside expertise for risk identification and calculation	**Network:** Consideration of all network actors perspectives and interests, consensus and persuasion through non-coercive means.	**Network:** Promotion of adaptation initiatives though cooperative collaboration and public-private partnerships	**Hierarchy:** Internal assessment of policy outcomes, infrastructure assessment, service reviews, internal reviews on measurable outcomes
	Community: Collection of local knowledge and expertise	**Market:** Financial lensing of impacts and economic vulnerability of public and private sectors	**Community:** Open public deliberation among community members, local assessment of adaptive efforts and expectation of civic engagement.	**Market:** laissez-faire or implementation of market Interventions to facilitate adaptive behaviour	**Market:** Assessment of costs and savings
Least Prefered	**Market:** Measurement of financial costs of climate events in both public and private sectors	**Community:** Collection of local knowledge and expertise	**Market:** Supply and demand projections, adaptive measure and insturment cost-benefit analysis	**Community:** Civic engagement, voluntary community programs	**Community:** Local input on success and failures, community insights

Because the initial stage of impact identification is largely driven by the accumulation of multiple social and scientific insights, network modes remain a viable means to begin the adaptation process. As governance literature has long discussed, networks are best suited to convene and foster participation via their collaborative nature and lack of coercive techniques that may ‘scare off’ key actors (Thompson, 2003). The plurality of inputs in networks also allows for consensus to develop with larger degrees of confidence as more actors input their knowledge on climate change science. Impacts in this sense do not have to be limited to technocratic interpretations of climate conditions moving forward, but also to diverse social interpretations (where justified).

In the early stages of adaptation a general network mode remains an effective means of impact identification. As the governance literature suggests though, hierarchical and community governance components should also be present at this stage to assure an equality of access to the impact identification stage, and to reduce the influence of elites in favour of democratic accountability. The inability of networks to assure equal access (O' Toole & Meier, 2004), then requires the built-in logic of democratic accountability of hierarchies (Bevir, 2009) and the core purpose of community governance (Tenbensel, 2005), to broaden local, place-based knowledge input.

Moving to the risk and vulnerability assessment, adaptation governance requires both inputs and legitimation, and here a mix of network, hierarchy, and market approaches becomes more necessary. The goal of the risk assessment stage is to identify, categorize, and prioritize risks (ICLEI, 2013). In the past, the risk and vulnerability assessment stage has led to shaping adaptation programs into sector-based programs (transport, energy, health, etc.) to streamline and ease conceptual issues. Here the role and authority of the democratic state to prioritize risk with legitimacy becomes most necessary.

As Table 5.3 presented, all four modes of governance provide means of assessing risk and vulnerability. Adaptation at this stage should balance the (democratically accountable) state legitimization of priorities with the plurality of inputs of network actors in public, private, and expert spheres. Risk assessment, by its nature, is the most contested portion of climate change adaptation due to the strong relationship between risk perception and values (O' Brien, 2009; Eriksen et al., 2015). While the structural promise of consensus that some assume in network governance needs to be constrained (Borzel, 2011), and risk of network capture guarded against (Peters & Pierre, 2004), the mode (along with community governance) undoubtedly provides an open, and sometimes progressive, space for equitable risk dialogue if moderated (steered) effectively (Thompson, 2003).

Within the third and fourth stages of adaptation is where the divergence of actor roles (collaborative versus coercive) and instruments were more pronounced in the project's findings and where it suggested that adaptation governance turn decidedly towards more

hierarchically influenced relations and instruments. Ultimately, deliberation and implementation need to occur with consideration of the whole policy triad (regulatory, market, persuasive) and each type's specific instruments. While local and NGO respondents in the study pointed to a strong interest in more regulatory approaches, there will certainly remain a role for voluntary adaptation initiatives, such as industry codes of practice and community-scale programs operated by commitment and trust. Further, while market approaches were largely under presented in the data (perhaps due to limited industry respondents), the mode's ability to identify economic costs and benefits is of value in prioritizing actions. Market governance, as it has been applied in some municipalities, should also be looked to for its ability to foster public or private adaptation through policy instruments such as taxes and subsidies (though market failure through exploitation of labour or unaccounted externalities cannot be overlooked).

Finally, adaptation governance in the review and assessment stage requires return to the value of network modes and the plurality of input they provide. Despite the critiques of network modes of governance (O'Toole & Meier 2004; Peters & Pierre 2004; Borzel, 2011), the need for networks remains, especially between government ministries and between federal-provincial orders. However, much like the risk assessment stage, this needs to be moderated (steered) by legitimate state structures. Nonetheless, Canada's federation is not an explicit hierarchy, and governance relations between federal and provincial governments were seen by participants as effective in existing network form as there are technically no formal hierarchical relations between these orders.

It should be stated then that throughout the project it was evident that *within* governments, the network mode of convening and non-coercion is effective and necessary given the mostly equal relations of ministries and departments (with the exception of central agencies). Internal government networks are valuable for gathering attention around the issue of adaptation among multiple ministires and gathering additional resources. Of course, within governments there are both voluntary and mandatory means of facilitating action across ministries or departments (at least within the realm of central agencies), and

both will need to be explored. In mainstreaming adaption throughout government, known concerns over ‘checking the box’ and ‘lip service’ should be considered along with identifying a lead department, and stronger enforcement by elected councils or central agencies.

5.2.3 Summary of Policy Recommendations

1) Existing practices of convening large networks of stakeholders and actors relevant to climate change adaptation are effective but must be designed with intention and the full policy and adaptation cycle in mind. Foremost, the objectives of the policy network, as convened or steered by government, must be made clear from a policy outcome perspective (i.e. what are the intended policy outcomes, including instruments). Collaboration for collaboration’s sake is not a reasonable goal and clearly-stated goals (recommendations for regulation, recommendations for market intervention, best practices, knowledge exchange, awareness building) are necessary to engage actors at the outset.

2) The goals for the full adaptation policy (including governance arrangements) must be understood and negotiated by all levels of government and misalignments identified and, where necessary, compromises reached. Non-governmental stakeholders should be brought into this discussion as well, but democratic accountability and the final responsibilities of governments should be respected to avoid network capture (powerful stakeholders over-influencing policy in their favoured direction). In short, all governance designs, in democratic states, require some infusion of hierarchical logic to remain accountable, legitimate, and evidently effective.

3) Third-party entities (boundary organizations, NGOs, research organizations, universities) can be effective venues for the negotiation and discussion of governance arrangement but should not be mistaken for governors themselves.

These venues are valuable for their potential impartiality and their continuity in the face of changes to government at any level due to an election.

4) Third-party forums for convening, whether at the direction of government or not, must also be organized in ways consistent with the complexities of adaptation. Along with the goals of any adaptation program, the terminology and conceptualization of adaptation must be considered. A positive example of this is the clear conceptualization of a sectoral lens on adaptation in the Canadian Adaptation Platform. A negative example of this is the lack of consideration of how regional or impact-based perspectives interact with the platform, or how participants can account for them.

5) Based on the study's findings, it is highly recommended that leadership, convening, and implementation (or implementation overseeing) roles be undertaken by the provincial governments. As outlined by study participants, the provincial governments are at the ideal scale to facilitate local implementation via multiple policy instrument options, as well as participate in wider national strategies for coordinated adaptation.

6) Internal to government, the effective communication of adaptation interests, current programs objectives, and needs, is fundamental to clarifying the full range of activities in Canada. Confusion over the lead roles of Natural Resources Canada (NRCAN), Environment and Climate Change Canada (ECCC) and other sector specific ministries such as Transport Canada (TC), Agriculture and Agri-Food Canada (AAFC) and Infrastructure Canada (IC), among others, need to be made clearer to one another, as well as to other governments and non-government actors.

5.3 Study Limitations

While the study was designed to be robust, rigorous, theoretically informed, and empirically based, as is the case with any research project, limitations remain. While two

provincial systems, including multiple municipal governments in Manitoba (Brandon, Winnipeg) and Ontario (Toronto, Mississauga, Peel Region, Durham Region), provide an adequate data set, more municipal or provincial representation could have added to the confidence in the findings. Further, some imbalance in access to practitioners was recognised as provincial respondents in Manitoba proved more accessible than their counterparts in Ontario. At the same time, it is also recognized that the Ontario respondents had significantly more experience with adaptation initiatives. A final limitation regarding respondents relates to issues of access to certain key adaptation practitioners within the Canadian federal government and representatives of First Nations and Indigenous communities. Future studies by the researcher would be designed to focus on a balanced and narrowed (likely by sector) set of respondents.

As discussed in Chapters 1 and 2, the theoretical framework of governance applied in this study is not meant as perfect encapsulation of all governance processes. The four-mode governance framework has a long history of development and application across public policy domains but remains meso-scale in its description of actual processes. Because the typology operates below macro-scale theories (such as capitalism, patriarchy, democracy) it works to apply identifiable, but imperfect, summaries of meso-scale processes. In this sense, the coarseness of the theory misses some micro-scale processes in exchange for theoretical clarity and distinction. As discussed in Chapter 3, in instances where one mode is identified as dominant, it is still quite possible that features from other modes remain in operation. Ultimately, the governance approach used in this project aims to work above the idiosyncratic and below the macro, providing some sensical narrative of process and structure in a manner that is both generalizable yet open to intervention in the near term.

As discussed in Chapter 2, because adaptation policies are nascent in Canada, especially as of 2013 when the research began, there was difficulty in developing a research agenda around particular policy types or outputs. As a result, the study was forced to approach adaptation far broader than would be ideal in a future where the field is more mature. What was lost in this approach was more nuanced and specific review of adaptation efforts by

sector or impact, as comparable policies at the same scale were most often not possible. This challenge was compounded by the unknown nature of adaptation practitioner access. Ultimately, the study was successful in fostering a large number of respondents across the two methodologies of interviews and workshops, but the backgrounds and expertise of these practitioners tended to vary. Nonetheless, the project accomplished what it intended to do in mapping current governance and identifying its preferred modes according to adaptation practitioners at multiple scales. It is nonetheless recognized that in the future this study will most likely by seen as an initial scan of an emerging issue rather than a definitive account.

Finally, the methodologies of interviews and workshops, while systematically employed, can always be improved. As the researcher developed improved interview skills throughout the project, not all earlier interviews were as efficient or effective as those later in the process. Further, due to cost and time restraints, the mix of in-person and phone interviews creates the slight potential for different knowledge exchange scenarios between researcher and respondents. Finally, while workshops were effective in providing the necessary information for the study (largely confirming the findings of the interview data), in future application of the method, the researcher would work to prepare audio or video recording, more detailed note taking of respondents, and better use of prompts. Nonetheless, the researcher identifies that all methods applications were learning processes as is part of the fulfillment of the PhD program, and no significant flaws were encountered. In consideration of both these limitations, and the above discussed findings, the following section outlines a research agenda for further work on adaptation governance.

5.4 Directions for Future Research

This study agrees with other calls that it is time for governance to bring competing modes (and their policy instruments) back into the literature (Sorensen & Torfing 2009; Capano et al. 2015), specifically on adaptation where they have scantly been addressed in the first place (Hong Phuong, et al. (2018). However, future research in adaptation governance will need to further test the usefulness and viability of the typology of governance applied in

this project (or competing governance typologies). In addition to this, further research on the use of various policy instruments for adaptation needs to be conducted. As scholarship moves to further identify means of assessing adaptation efforts, these assessment methods cannot be separated from the politics of actor relations and instrument selection. Accordingly, the adaptation literature as a whole is yet to thoroughly engage policy instrument debates; with few exceptions such as Mees et al. (2014) and Henstra (2015). The adaptation assessment literature will need to identify how metrics of 'adaptation success' relate, and overlap with, questions of policy instrument selection and governance modes.

While this study has worked to reveal visions of governance across different scales, more work will be needed to increase insights into practitioner and stakeholder *preferences* of adaptation governance. Unlike much of the public perception work already conducted in relation to climate change mitigation (greenhouse gas reduction), there is considerably less evidence pertaining to perspectives on adaptation, especially regarding governance. Few studies have engaged the issue of public perception and visions of adaptation and its governance (Wellstead et al. 2013; Eriksen et al. 2015). Further, to date, most of research on adaptation, including this project, has been limited to expert practitioners and community organizations often made-up of climate activists.

While this study provided considerable insights from many current and past government bureaucrats, preferences and support among adaptation practitioners in bureaucratic roles need to be understood as distinct from elected officials with the ability to operationalize policy instruments. Research into the views of elected officials regarding climate change adaptation is of paramount need in the empirical literature. As workshop respondents pointed out, adaptation remains a secondary issue to mitigation in political rhetoric, and elected officials who champion the topic may be key to changing such a scenario. In line with research in disaster and natural hazards scholarship, adaptation governance scholars could further conduct research that compares respondent preferences for adaptation politics to those living with the impacts of climate change.

Additionally, this project's finding that local governments are more willing to engage alternative, or complimentary, modes of governance to the dominant network order requires further testing and exploration. If this local preference for infusion of hierarchy (or other competing modes) holds up across other jurisdictions, then issues of why this scenario has evolved are necessary. As discussed in Chapters 3 and 4, it is possible to surmise that being on the forefront of climate impacts and stakeholder relations has forced local governments (those who acknowledge climate change) to intervene with 'stronger' policy instruments or face the consequences; however, this needs to be further tested empirically.

Finally, specific conditions of federal or other multilevel, systems need to be accounted for. In Canada, local governments have limited regulatory and taxation authority and questions of what governments should do on adaptation in relation to their potential intervention capacity remain unclear and intrinsically connected to the history of Canadian federalism. Some respondents in this study suggested that higher order governments have refrained from command and control and market intervention because of the political risks of these instruments. This is as known factor in both the popularity (Borzel 2011; Zehavi 2012) and critiques (Peters & Pierre, 2004) of networks. Exploring why governments prefer networks for climate change adaptation, and shun other modes, requires more investigation, especially in light of other recent work that has identified waning interest in network processes (Oulahen et al., 2018; Waters & Barnett, 2018)

5.5 Summary & Conclusion

This project set out to address literature gaps in adaptation governance related to conceptual clarity, theoretical-empirical connectivity, empirical description, and critique. Building upon the findings from 81 interviews, document analysis, and two expert workshops, the project has contributed to both theory and empirical knowledge on the emerging sub-field of climate change adaptation governance. The project applied a long-standing theoretical framework of competing governance modes to empirical cases of adaptation in Canada

across three orders of government and revealed potential for the framework in further sorting the complexity of adaptation and pathways forward.

Through qualitative primary data collection, the project also robustly characterized the current modes of adaptation in Canada using two provinces and their largest urban centres as proxies. Finally, through this characterization, theory building on the relationship between network governance failure and the adaptation implementation deficit was facilitated and empirically supported. Through comparison of insights from a robust set of practitioners at multiple scales, the project addressed a novel, but pressing, research question regarding the perception of appropriate governance for climate change adaption amongst practitioners at various scales. Analysis of responses, coupled with the insights of expert workshops identified a marked distinction, or governance gap, in the visions of local and higher order governments regarding adaption.

In this concluding chapter the thesis has provided tangible suggestions for effective roles in adaptation governance in Canada and outlined a vision of governance across the adaptation cycle. This chapter has also summarized academic and policy contributions of the study to the wider literature, in complement to those already highlighted in each chapter. Finally, through discussion of limitations and future directions, this chapter concluded with an outline for further research in the area of climate change adaptation.

Adaptation is not an option, if you look for it you'll find that climate change is all around. Undoubtedly the impacts from the era of capital and climate change are here and projected to worsen. How a just, and non-exploitive, society will steer its way through these impacts, and, hopefully, thrive in their midst, rests on answering many of the questions of adaptation governance discussed in this project. As it set out to do, through a mixed-method, multi-case site approach, this thesis has provided significant contributions to the answer of the question of "who does what, and how" in preparing for, and living in, the age of climate change.

5.6 References

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Appendices

Appendix A: Documents Reviewed

	Actor	Year	Document Type	Title	Adaptation Frame	Notes
1	City of Brandon	2013	Report	Brandon's Environmental Strategic Plan	General	
2	City of Mississauga	2012	Fact Sheet	City of Mississauga's Stormwater Program	Impacts	
3	City of Mississauga	2012	Report	Stormwater Financing Study (Phase 1) - Funding Recommendations	General	
4	City of Mississauga/ AECOM	2013	Report	Stormwater Financing Study	General	Key Document
5	City of Mississauga	2015	Policy	Stormwater Funding Program	Impacts	Key Document
6	City of Toronto	2008	Report	Preparing Toronto for Climate Change: Development of a Climate Change Adaptation Strategy	General	
7	City of Toronto	2008	Policy	Ahead of the Storm: Preparing Toronto for Climate Change	General	
8	City of Toronto	2008	Report	Report on Public Engagement on Climate Change Adaptation	General	
9	City of Toronto - Public Health/CAP	2010	Report	The Feasibility of Implementing Interactive Online Mapping for Toronto Public Health Heat Vulnerability Products	Vulnerability	
10	City of Toronto - Public Health	2010	Report	Validating the Toronto Spatial Heat Vulnerability Assessment: Research Findings and Proposed Methods	Vulnerability	
11	City of Toronto	2011	Report	Toronto's Adaptation Actions - April 2011	General	Key Document

12	City of Toronto - Public Health	2011	Report	Implementation of a Map-Based Heat Vulnerability Assessment and Decision Support System	Vulnerability	
13	City of Toronto - Public Health/CAP	2011	Report	Climate Change Adaptation and Health Equity	Vulnerability	
14	City of Toronto - Public Health	2011	Report	Protecting Vulnerable People from Health Impacts of Extreme Heat	Vulnerability	Key Document
15	City of Toronto - City Clerk	2013	Report	Exploring Health and Social Impacts on Climate Change in Toronto	General	
16	City of Toronto - Parks and Environment Committee	2013	Report	Resilient City: Preparing for Extreme Weather Events (Nov 22)	General	Key Document
17	City of Toronto - Energy and Environment	2014	Report	Best Practices in Climate Resilience from Six North American Cities	General	
18	City of Toronto - Parks and Environment Committee	2014	Report	Resilient City: Preparing for Extreme Weather Events (July 9)	General	
19	City of Toronto/ SENES	2014	Report	Toronto's Future Weather and Climate Driver Study: Outcomes Report	Assessment	Key Document
20	City of Toronto	2015	Report	Transform TO: Climate Action for a Healthy, Equitable, and Prosperous Toronto: Community Engagement Report	General	
21	City of Toronto	2015	Policy	Toronto Green Standard: Making a Sustainable City Happen (Version)	Planning	Key Document
22	City of Toronto - Toronto Hydro/ AECOM	2015	Report	Toronto Hydro-Electric System Limited Climate Change Vulnerability Assessment	Vulnerability	

23	City of Toronto - Parks and Environment Committee	2016	Report	Resilient City: Preparing for a Changing Climate Status Update and Next Steps	General	Key Document
24	City of Toronto - Parks and Environment Committee	2016	Report	Transforms: Climate Action for a Healthy Equitable, and Prosperous Toronto - Report #1	General	Key Document
25	City of Toronto	2017	Report	Reducing Vulnerability to Extreme Heat in the Community and at Home	Vulnerability	Key Document
26	City of Toronto	2018	Report	2018 Operating Budget Briefing Note: TransformTO	General	
27	City of Winnipeg	2011	Report	Climate Change Adaptation in Winnipeg Workshop	General	Key Document
28	City of York	2010	Policy	A Climate Change Action Plan for York	General	
29	Government of Canada - Natural Resources Canada	2007	Report	From Impacts to Adaptation: Canada in a Changing Climate 2007	Impacts	Key Document
30	Government of Canada - Health Canada	2008	Report	Human Health in a Changing Climate: A Canadian Assessment of Adaptive Capacity	Vulnerability	
31	Government of Canada - Natural Resources Canada	2008	Report	Climate Change Impacts on Canada's Prairie Provinces: A Summary of our State of Knowledge	Impacts	
32	Government of Canada	2010	Report	Understanding Climate Change Adaptation and Adaptive Capacity	General	
33	Government of Canada/Canadian Institute of Planners	2011	Guidance	Climate Change Adaptation Planning: A Handbook for Small Canadian Communities	Planning	
34	Government of Canada	2016	Policy	Federal Adaptation Policy Framework	General	

35	Government of Canada - Natural Resources Canada	2011	Fact Sheet	Canada's Regional Adaptation Collaborative Program	General	
36	Government of Canada - Health Canada	2011	Guidance	Adapting to Extreme Heat Events: Guidelines for Assessing Health Vulnerability	Vulnerability	
37	Government of Canada - Natural Resources Canada/CAP	2011	Guidance	Protecting your Community from Climate Change Adaptation: A Training Program for Ontario Municipalities	General	
38	Government of Canada - Health Canada	2011	Guidance	Communicating the Health Risks of Extreme Heat Events	Planning	
39	Government of Canada/ Canadian Institute of Planners	2012	Report	Climate Change Planning: Case Studies from Canadian Communities	Planning	
40	Government of Canada/ Canadian Institute of Planners	2012	Report	Model Standard of Practice for Climate Change Planning	Planning	
41	Government of Canada - Natural Resources Canada/ICLEI	2012	Guidance	Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation	General	Key Document
42	Government of Canada	2012	Guidance	Landed Use Planning Tools for Local Adaptation to Climate Change	Planning	
43	Government of Canada	2010	Guidance	Adapting to Climate Change: An Introduction for Canadian Municipalities	General	
44	Government of Canada/ICLEI	2012	Guidance	Leadership& Legacy: Handbook for Local Elected Officials on Climate Change	General	
45	Government of Canada/ICLEI	2012	Guidance	Having the Climate Conversation: Strategies for Local Government	General	

46	Government of Canada/IISD	2013	Report	Strengthening Adaptive Capacity in Four Canadian Provinces: ADAPTool Analysis of Selected Sectoral Policies	Planning	
47	Government of Canada/ Council of Ministers	2014	Report	Transportation and the Environment: Task Force Report	General	
48	Government of Canada - Natural Resources Canada	2014	Report	Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation	Impacts	Key Document
49	Government of Canada - Canadian Council of Ministers of the Environment	2015	Guidance	Implementation Frameworks for Climate Change Adaptation Planning at Watershed Scale	Planning	
50	Government of Canada - Natural Resources Canada/ICLEI	2015	Report	Are We There Yet? Applying Sustainability Indicators to Measure Progress on Adaptation	Assessment	
51	Government of Canada/Quest Consultants	2015	Report	Resilient Pose and Wires Report: Adaptation Awareness, Actions, and Policies in the Energy Distribution Sector	Implementation	
52	Government of Canada - Natural Resources Canada	2016	Report	Canada's Climate Change Adaptation Platform: Projects and Results (October 2016)	General	Key Document
53	Government of Canada - Natural Resources Canada - ICLEI	2016	Report	Making Strider on Community Adaptation in Canada	General	Key Document
54	Government of Canada	2016	Report	Working Group on Adaptation and Climate Resilience - Final Report	General	Key Document

55	Government of Canada - Natural Resources Canada	2016	Report	Canada's Climate Change Adaptation Platform: ProJet's and Results (January 2016)	General	Key Document
56	Government of Canada - Natural Resources Canada	2017	Report	Canada's Climate Change Adaptation Platform: Infrastructure and Buildings Working Group State of Play	General	Key Document
57	Government of Canada- Office of the Auditor General	2017	Report	Fall Reports of the Commissioner of the Environment and Sustainable Development: Adapting to the Impacts of Climate Change	General	Key Document
58	Government of Canada - Office of the Auditor General	2018	Report	Perspectives on Climate Change in Action: A Collaborative Report from Auditors General	General	Key Document
59	Government of Manitoba - Agriculture, Food, and Rural Initiatives	2010	Report	Adapting Agriculture to Climate Variability	General	
60	Government of Manitoba - Municipal Relations	2011	Guidance	Climate Change Adaptation Through Land Use Planning	Planning	Key Document
61	Government of Manitoba/Natural Resources Canada	2011	Report	Manitoba's Agricultural Climate Change Adaptive Planning Workshop	Planning	
62	Government of Manitoba/Natural Resources Canada	2011	Report	PRAC Combined Water Drought Excessive Moisture Forum	Impacts	
63	Government of Manitoba/Genivar	2012	Report	PRAC Municipal Adaptive Planning Study	Planning	Key Document

64	Government of Manitoba/IISD	2012	Report	Adaptation in t Water Sector in Manitoba: A policy Discussion Following the Activities of the PRAC Water Theme	General	
65	Government of Manitoba/IISD	2012	Report	Manitoba's Involvement in the Prairies Adaptation Collaborative: Syntheses Report	General	Key Document
66	Government of Manitoba/Natural Resources Canada	2012	Report	Workshop: Adapting Agriculture to Climate Change: Next Steps Planning Session	General	
67	Government of Manitoba - Conservation and Water Stewardship	2012	Report	Provincial Planning on Adaptation for Excessive Moisture in the Interlake Region	Planning	Key Document
68	Government of Manitoba	2012	Policy	Tomorrow NOW: Manitoba's Green Plan	General	
69	Government of Manitoba/Natural Resources Canada	2012	Report	Manitoba Prairies Regional Adaptation Collaborative Final Forum	General	
70	Government of Manitoba/IISD	2014	Report	Energy and the Built Environment: Reducing Emissions, Improving Efficiency and Enhancing our Resilience	General	
71	Government of Manitoba/IISD	2014	Report	Moving Forward on Climate Change Adaptation in the Prairies	General	
72	Government of Manitoba	2015	Report	Agriculture Risk Management in Manitoba: Task Force Report	General	Key Document
73	Government of Manitoba - Manitoba Hydro	2015	Report	Climate Change Assessment for Hydropower Project Licensing	Planning	

74	Government of Manitoba - Sustainable Development	2015	Policy	Manitoba's Climate Change and Green Economy Action Plan	General	Key Document
75	Government of Manitoba	2015	Report	PRAC Annual Report (2014-2015)	General	
76	Government of Manitoba - Office of the Auditor General	2017	Report	Managing Climate Change: Audit	General	Key Document
77	Government of Manitoba - Sustainable Development	2017	Report	Manitoba's Report on Climate Change for 2016	General	
78	Government of Ontario - Ministry of Environment	2011	Policy	Climate Progress - Ontario’s Plan for a Cleaner, More Sustainable Future	General	
79	Government of Ontario - OCCIAR	2011	Guidance	A Practitioner's Guide to Climate Change Adaptation in Ontario's Ecosystems	General	
80	Government of Ontario - Ministry of Environment	2011	Policy	Climate Ready: Ontario's Adaptation Strategy and Action Plan	General	Key Document
81	Government of Ontario - Environmental Commissioner of Ontario	2012	Report	Ready for Change: An Assessment of Ontario's Climate Change Adaptation Strategy	General	Key Document
82	Government of Ontario/Golder Associates	2012	Report	Climate Change Vulnerability Assessment for Infrastructure Ontario	Vulnerability	
83	Government of Ontario - Environmental Commissioner of Ontario	2014	Report	Sink, Win or Tread Water? Adapting Infrastructure to Extreme Weather Events	Vulnerability	Key Document

84	Government of Ontario - Municipal Affairs and Housing	2014	Policy	Provincial Policy Statement: Under the Planning Act	Planning	Key Document
85	Government of Ontario - Health and Long-Term Care	2016	Guidance	Ontario Climate Change and Health Vulnerability and Adaptation Assessment Guidelines	Vulnerability	Key Document
86	Government of Ontario - Auditor General of Ontario	2017	Report	Chapter 3: Climate Change	General	
87	Government of Ontario - Natural Resources and Forestry	2017	Policy	Naturally Resilient: MNRF's Natural Resource Climate Adaptation Strategy	General	
88	Government of Ontario - Municipal Affairs and Housing	2017	Fact Sheet	Info Sheet: Planning for Climate Change	Planning	
89	Region of Durham	2016	Policy	Towards Resilience: Durham Community Climate Adaptation Plan 2016	Resilience	Key Document
90	Region of Peel	2011	Policy	Peel Climate Change Strategy Background Report	General	Key Document
91	Toronto Regional Conservation Authority	2012	Report	Mainstreaming Climate Change Adaptation in Canadian Water Resource Management	Planning	

Appendix B: Interview Guide

Interview Guide

This interview guide is intended as a general framework for the researcher to follow during conversations with respondents. The themes and questions are designed to allow for free flowing conversation and elaboration of experiences and professional opinions. Due to the grounded nature of the interview approach it is possible that conversations may vary and probes and clarifications may emerge organically in conversation. While the interview guide may develop slightly during the research process, the topics will not, and the participant risk will always remain very low.

All questions derive from three of the project's four research questions and are indicated as so. The questions are:

RQ1) what are the current modes of multilevel governance surrounding climate change adaptation in Canada?

RQ2) in what form is multilevel governance desired by climate change adaptation practitioners in Canadian government?

RQ3) what are the perceived barriers (or enablers) to productive government relationships on climate change adaptation actions?

Generally each research question is addressed in the following order: questions about actors, questions about policy instruments, questions about overall governance form.

1) **RQ 1 - What are the current modes of multilevel governance in climate change adaptation?**

The first set of questions is aimed at understanding how climate change adaptation is currently taking place in Canada.

a. INTRO - Please tell me about your experiences with climate change adaptation issues in the past, in what way have you or your department been involved in climate change adaptation policies or planning?

b. ACTORS - People involved in climate change can represent a wide variety of actors, who would you identify as the key actors in climate change adaptation in the _____ (city/province/country)?

c. ACTORS - Now and in the past, have other levels of government been involved with the adaptation plans or policies you've worked on?

d. ACTORS - What kinds of interactions do you typically have with other levels of government?

   i. *Probe* – formal or informal

   ii. *Probe* - Regularly or rarely

   iii. *Probe* - Facilitated, forced, or organic

e. ACTORS – How important is collaboration between levels of government to your government's approach to climate change adaptation?

f. ACTORS - Do other levels of government currently reach out to you to advance adaptation issues?

g. INSTRUMENTS – Are there any policies or plans you would identify as key in the_____ (city/province/country)'s approach to climate change adaptation in the past and presently?

h. INSTRUMENTS - Policy instruments are often divided into a basic typology (*go-over handout*): persuasion instruments such as information campaigns and voluntary agreements, market-based instruments such as new taxes, or credits, and regulatory instruments such as minimum standards and performance metrics. Are there any instruments, or instrument types, being employed which you would identify as key to current adaptation efforts in the _____ (city/province/country)?

i. GOVERNANCE – For this question I am going to present to you four common architypes of multilevel governance which are meant to represent simplified ideals of the relationships amongst governments and with other actors, they are (*go-over handout*):

    i. Hierarchy - Higher level governments deliver objectives to lower level governments and the private sector. This may include specific goals, even specific means of reaching those goals.

    ii. Network - All levels of government as well as members of the private sector negotiate and partner with one another to deliver adaptation options and plans, goals and means are negotiated at whatever is deemed the most appropriate level.

    iii. Market - Adaptation is achieved through a market approach and private actors adapt as needed while public services are adapted largely through privatization.

iv. Communities - Individuals and the private sector adapt at their own desires and governments adapt when they are mandated to by the public, usually at the lowest appropriate level.

Could you relate the current politics of climate change adaptation in Canada to any of these scenarios?

2) **RQ2 – What are the desired forms of multilevel governance on climate change adaptation?**

   This second set of questions is aimed at understanding what you see as ideal scenarios of multilevel governance, which may include how things are already operating, or may diverge from current practices.

   a. ACTORS – (SKIP IF COVERED) - Do you think collaboration between levels of government is necessary for good climate change adaptation policies? Why or why not?

   b. ACTORS – IF YES - what kind of interactions do you feel are needed between levels of government?

      i. *Probe* – formal or informal

      ii. *Probe* - Regularly or rarely

      iii. *Probe* - Facilitated, forced, or organic

   c. ACTORS - As we discussed earlier, the people involved in climate change can represent a wide variety of actors. Who would you identify as the key actors that *should* be involved in climate change adaptation in the _____ (city/province/country)?

   d. INSTRUMENTS - We also discussed the traditional forms of policy instruments. Are there any instrument types, or specific instruments, you think *should* be used

in the _____ (city/province/country)'s approach to climate change adaptation?

e. INSTRUMENTS/ACTORS - There is a lot of discussion in climate change adaptation about 'boundary organizations'. These are typically organisations that work to connect levels of government, private and public actors. Do you think they are necessary for climate change adaptation? If so, who should create and fund them?

    i. Examples if necessary: Private – FCM, ICLEI. Government – Ouranos, RAC's

f. GOVERNANCE – I would like to ask you now about some specific climate change impacts that may affect multiple government jurisdictions at one time.

If necessary, use this example, or, if possible, example from respondent's specific field: Consider the impact of extreme rain events and the effects of overrun storm sewers and damaged roads. In such a scenario there are impacts at the local level, and adaptation options that fall into the jurisdiction of each level of government, such as public transportation and traffic lights (local), road repairs and sewer expansion (provincial), and highway maintenance, and disaster recovery (federal). In short it can be assumed that to proactively adapt the community to these effects all three levels of government would need to be involved.

i. Whose responsibility is it to identify adaptation needs such as vulnerable systems, peoples, or infrastructure in a given community?

ii. Who should develop the specific plans (such as to prepare outdated systems for a different climate)?

iii. How should these adaptation plans be funded?

iv. Which level of government, if any, should be carrying out climate research needed to identify current and future adaptation needs?

v. What level of government should work to ensure that Canadian communities are aware of the risks and know the reasons for these expenditures?

g. GOVERNANCE - Returning to the four multilevel governance scenarios from earlier, which one(s) do you think *should* be most prominent in climate change adaptation efforts?

3) What are the Barriers (or enablers) to government collaboration on climate change adaptation?

We've explored the current state of multilevel governance and climate change adaptation, and your views on its potentially ideal form. Having discussed how it is, and how it could be, I would like you now to consider the causes of the current situation (good or bad).

a. I am going to start by asking you whether, in your professional opinion, there is currently adequate collaboration between levels of Canadian government on climate change adaptation issues.

b. ACTORS - Are there any specific actors, or types of actors, you would identify as limiting or fostering collaboration on climate change adaptation? What is it that they are, or are not, doing that may be contributing to collaboration or its absence?

i. Is there divergence between expectations of who should be involved?

c. INSTRUMENTS - Are there specific policy instruments, or types of instruments, that seem to be limiting or fostering collaboration on adaptation?

i. Is there divergence between expectations of which policy instruments to use to address adaptation?

d. GOVERNANCE - What other factors do you think might be limiting or fostering collaboration?

    i. *(probe)* are there different philosophies regarding multilevel governance (returning to the four approaches described above)?

    ii. *(probe)* are there different philosophies regarding climate change adaptation?

Appendix C: Western University Research Ethics Approval

Western Research

Research Ethics

Western University Non-Medical Research Ethics Board
NMREB Delegated Initial Approval Notice

Principal Investigator: Dr. Gordon McBean
Department & Institution: Social Science\Geography,Western University

NMREB File Number: 107114
Study Title: The Multilevel Governance of Climate Change Adaptation: Government Collaboration in Two Canadian Provinces
Sponsor:

NMREB Initial Approval Date: September 29, 2015
NMREB Expiry Date: September 29, 2016

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Other	Request for Information	2015/09/15
Revised Western University Protocol	Western Protocol	2015/09/15
Recruitment Items	Email Recruitment – Workshop - New	2015/09/15
Recruitment Items	Email Recruitment	2015/09/15
Revised Letter of Information & Consent	Letter of information	2015/09/15
Instruments	Interview Guide	2015/09/15
Recruitment Items	Email Recruitment – Workshop - Return	2015/09/15
Other	Information for Colleague	2015/09/15
Instruments	Workshop Questionnaire	2015/09/15
Instruments	Workshop Worksheet	2015/09/15

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the NMREB 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 NMREB 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.

[redacted] Chair or delegated board member

Ethics Officer to Contact for Further Information

Erika Basile	Grace Kelly	Mina Mekhail	Vikki Tran
[redacted]	[redacted]	[redacted]	[redacted]

This is an official document. Please retain the original in your files.

Curriculum Vitae

Daniel J. Bednar
Department of Geography
Centre for Environment & Sustainability
Centre for Planetary Science and Exploration
Western University

EDUCATION

2018 - Doctorate of Philosophy
- Geography (with specialization in Environment and Sustainability)
- Western University, London, Canada

2012 - Master of Arts
- Geography (with specialization in Environment and Sustainability)
- Western University, London, Canada

2010 - Bachelor of Arts
- Political Science, Environmental Science (Double Major)
- University of Winnipeg, Canada

AREAS OF SPECIALIZATION

- Climate Change Adaptation
- Environmental Governance
- Canadian Environmental Policy
- Geopolitics
- Satellite Infrastructure and Applications
- History of Space Exploration

WORK EXPERIENCE

2018 – Present Program Analyst
- Canadian Space Agency, Vice President's Office, Strategic Relations Team
- Manager: Taryn Tomlinson
- Role: Review ongoing programing and communicate with outside ministries to identify mainstreaming potential for CSA technologies, and products, across government. Foster intragovernmental relationships with goal of program development. Review and compile literature reviews and meeting agendas.

2012-2017 Researcher & Project Coordinator

- Principal Investigator: Dr. Gordon McBean, Western University
- Project: Integrating Strategies for Climate & Weather Risk Reduction in Canada
- Role: Provide in-depth literature review on status of climate change adaptation in Canada, developed and operationalized a research project to address literature gaps and provide deliverables in collaboration with government, industry and NGO community.

2016 Science Documentation and Data Downlink

- Principal Investigator: Dr. Gordon Osinski, Western University
- Project: Canadian Space Agency Mars Sample Return Simulation (CanMars)
- Roles: Document and synthesize science discussion during rover operations and planning. Liaison with science and engineering lead regarding key decisions for purpose of accuracy in documentation. Backup data downlink coordinator between filed site and mission control.

2011-2012 Research Assistant

- Principal Investigator: Dr. Gordon McBean, Western University
- Project: The Geopolitics of Climate Change in the Canadian Arctic
- Roles: Conduct literature review of climate impacts in Canadian Arctic and document political response to these changes amidst contemporary geopolitical context and the UNCLOS processes.

2010 Research Assistant & Field Interviewer

- Principal Investigator: Gino Distasio, University of Winnipeg
- Project: Sustainable Churchill
- Role: Provide literature review of all existing social and environmental sustainability research on Churchill and other Northern Canadian communities, help field team interview Churchill residents and facilitate community workshops

TEACHING EXPERIENCE

2017-Current – Online Course Developer

- Western University, Centre for Planetary Science and Exploration – *The History of Space Exploration*

2012-Current - Instructor

- Western University, Department of Geography – Geog 2090: *Space Exploration*
- Western University, Department of Biology – EnvrSci 1021: *Environmental Issues*

2010-2017 - Teaching Assistant (Undergraduate Courses)

- Western University, Department of Geography – Geog 2090: *Space Exploration*
- Western University, Department of Geography – Geog 2050: *Geopolitics*
- Western University, Department of Geography – Geog 2333: *Climate Change*

2016 Graduate Course Teaching Assistant

- Western University, Centre for Environment & Sustainability – EnvrSust 9011A: *Foundations of Sustainability*

2016 Educational Camp Instructor

- Western University, Centre for Planetary Science and Exploration - *Space Camp*

GRANTS & SCHOLARSHIPS

2018 Canadian Space Agency 2018 IAC Student Participation Initiative Grant

- Awarded by: Canadian Space Agency
- Amount $6000

2016 E-Campus Ontario Development Grant (Co-Applicant)

- Lead Applicant: Dr. Gordon Osinski, Western University
- Awarded by: Government of Ontario
- Amount: $750,000/ 2 years

2013 SSHRC Insight Grant (Contributing Researcher)

- Lead Applicant: Dr. Gordon McBean, Western University
- Awarded by Government of Canada Social Science and Humanities Research Council
- Amount: $166,000/ 4 years

2012 Western Graduate Research Scholarship (Lead Applicant)

- Awarded by: Department of Geography, Western University
- Amount: $105,700/ 4 years

2011 Western University Faculty of Social Science Agnes Cole Dark Fund Scholarship (Co-Applicant)

- Lead Applicant: Dr. Dan Shrubsole, Western University
- Amount: $2500

2010 Department of Geography Western Graduate Research Scholarship (Lead Applicant)

- Amount: $34,000/ 2 years

2009-2010 Government of Canada Millennium Scholarship (Lead Applicant)
- Amount: $3000 Annually

2007-2010 Manitoba Scholarship for Students from Low-Income Families
- Amount: $ 1500 Annually

AWARDS & DISTINCTIONS

2018 Space Generation Advisory Council Global Delegate
- 1 of 50 Global Delegates
- Selected to represent under-35 space leaders

2017 & 2011 Western University Society of Graduate Students Teaching Assistant Award (Nominated)
- Nominated by: Students (GEOG 2050, EnvrSust 9011A)
- Awarded for: Excellence in teaching assistant position

2017 Centre for Planetary Science and Exploration Outreach Award
- Awarded for: Excellence in public outreach

2016 & 2011 Western University Department of Geography Michael J. Troughton Award
- Awarded for: Excellence in environmental research in a rural context
- Amount: $1500

2013 Western University Department of Geography E.G. Pleva Teaching Award
- Awarded for: Excellence in Teaching (GEOG 2090: Space Exploration)
- Amount: $1000

2012 9th Annual Earth Day Colloquium: Best Presentation

2011 Western University Faculty of Social Science Graduate Alumni Award
- Awarded for: Performance and financial need
- Amount: $1000

PUBLICATIONS

Peer Reviewed Publications
- **Bednar, D**. & Henstra, D. (2018). Applying a Typology of Governance Modes to Climate Change Adaptation. *Politics and Governance.* 6(3).

- Osinski, O., Battler, M., Caudill, C., Francis, R., ...**Bednar, D**. (2018). The CanMars Mars Sample Return Analogue Mission. *Journal of Planetary & Space Science*

- Walker, C., Mason, S., & **Bednar, D.** (*2018*). Development, Urban Bias, and Inequalities in Rural Ontario, Canada. *Journal of Rural and Community Development.* 13(2).

Manuscripts Currently Under Peer Review

- **Bednar, D.** (*2018).* Occupy Earth: Deconstructing and Reconstructing the Outer Space Treaty for Climate Change Geopolitics. Special Issue on the Critical Geopolitics of Outer Space, *Geopolitics*.

- **Bednar, D.**, Hawkswell, J., King, D., Battler, M., Kerrigan, M., & Osinski, G. (*2017).* Documentation of Daily Communications and Decision-Making Processes for CanMars Analogue Mars Rover and Sample Return Mission. *Journal of Planetary & Space Science.*

- **Bednar, D.**, Henstra. D, & McBean, G. (2018). The Governance of Climate Change Adaptation: Are Networks to Blame for the Implementation Deficit? *Journal of Environmental Policy and Planning.*

Manuscripts in Progress or Revision for Peer Review

- **Bednar, D.** McBean, G, Henstra, D. A Multilevel Analysis of Practitioner Governance Preferences for Climate Change Adaptation

- Remilliard, J., **Bednar, D.** & McBean, G. Multilevel Governance and Climate Change Adaptation in Ontario

- Klinger, J. & **Bednar, D.** An Introduction to the Critical Geopolitics of Outer Space. Geopolitics: Special Issue: The Critical Geopolitics of Outer Space, *Geopolitics.*

- **Bednar, D.** & Shrubsole, D. Cross Border Water Conflict and News Media Narratives: The Case of Devils Lake, North Dakota.

Non-Refereed Publications

- **Bednar, D.** (2018). Space Based Data for Climate Change Adaptation: The Need to Identify Pathways for Access and Use in Early and Non-Space-Faring Countries. *Proceedings of the 69th International Astronautical Congress*, Bremen, Germany.

- **Bednar, D.,** Harford, D., McBean, G., Peters, W., & Satzewich, J. (2018). *Workshop Proceedings: Climate Change Adaptation Governance in BC*. Adaptation to Climate Change Team (ACT) Report. Simon Fraser University, Vancouver, B.C.

- **Bednar, D**., Raikes, J., & McBean, G. (2018). The Governance of Climate Change Adaptation in Canada. *Institute for Catastrophic Loss Reduction. Research Paper Series*, No. 60., 72 pp. ISBN: 978-1-927929-12-4.

- Osinski, O., Battler, M., Caudill, C., Francis, R., ...**Bednar, D**. (*2017).* Overview of the 2016 #CanMars MARS Sample Return Analogue Mission. Scientific Abstract 2417. *48th Annual Lunar and Planetary Science Conference*, The Woodlands, TX.

- Hawkswell, J., King, D., **Bednar, D.,** Battler, M., M., & Osinski, G. (2017). Documentation of Science and Planning Team Activities for the 2016 CanMars Sample Return Analogue Mission. Scientific Abstract 2398. *48th Annual Lunar and Planetary Science Conference*, The Woodlands, TX.

- **Bednar, D.** (2012). Geography, News Media Discourse, and Water Management: A Case Study of the Devils Lake Outlet. *Western University Electronic Thesis and Dissertation Repository.*

Popular Publications

- **Bednar, D.** (2018). What is Climate Change Adaptation? The Adaptation Cycle. *Medium*, June 2018.

- **Bednar, D.** (2018). The Geography of Space Exploration: Who was the third Country in Space? *Medium*, March 2018.

- **Bednar, D.** (2018). The Geography of Space Exploration: It's Always Political. *Medium*, February 2018.

- Harrison, T. & **Bednar, D**. (2017). Keeping an Eye on Climate Change. *Slate*, March 2017.

PRESENTATIONS, PANELS, & WORKSHOPS

Invited Talks

- **Invited Presentation:** Accessing Satellite Data for Climate Change Adaptation in Developing Countries. International Astronautical Conference Exhibition Hall Public Lecture. Bremen, Germany, October 3rd, 2018.

- **Panel Discussant:** Attending Conferences: Experiences and Best Practices. Department of Geography Speaker Series. Western University, London, ON. March 9, 2018.

- **Guest Speaker:** Conducting Qualitative Interviews: Lessons Learned. GEOG3250: Social Science Research Methods in Geography. Department of Geography, Western University. Nov 6, 2017

- **Invited Presentation:** 50 Years of the Outer Space Treaty: What's in it and Where is it Going? Western University Centre for Planetary Science and Exploration Forum. London, ON. October 20, 2017.

- **Panel Discussant:** Opportunities and Challenges in Climate Change Adaptation. Annual Meeting of the American Association of Geographers. Boston, MA. April 5-9, 2017.

- **Panel Discussant:** Challenges of Graduate Level Student Leadership: Experiences from Past Presidents. Annual Meeting of the American Association of American Geographers. San Francisco, CA. March 30-April 2, 2016.

- **Guest Speaker:** The History of Space Politics and the Outer Space Treaty. Geography 2090, Department of Geography, Western University. London, ON. November 3, 2016.

- **Guest Speaker:** The History of the Space Shuttle Program. Geography 2090A: Space Exploration, Western University, London, ON. October 3, 2013.

- **Guest Speaker:** Canada's Arctic Strategy under the Harper Government. Geography 9334: Environmental Policy, Western University, London, ON. October 24, 2011.

Conference Papers & Oral Presentations

- **Bednar, D.** (2018). Space-Based Data for Climate Change Adaptation: The Need to Identify Pathways for Access and Use in Early and Non-Space-Faring Countries. 69th International Astronautical Congress, Bremen, Germany. October 1-5.

- **Bednar, D.** & Henstra, D. (2018). A Typology of Governance Modes for Climate Change Adaptation. Annual Meeting of the American Association of Geographers. New Orleans, LA. April 10-14.

- **Bednar, D.** (2018). #OccupyEarth: Deconstructing and Constructing the Outer Space Treaty for Climate Change Geopolitics. Annual Meeting of the American Association of Geographers. New Orleans, LA. April 10-14.

- **Bednar, D.** (2018). Geographies of Scale: Applying Hyndman's Feminist Geopolitics to Space Activities. Women in Planetary Science Conference. Toronto, ON. February 17-18,

- **D. Bednar** (2017). A Critical Geopolitics of Space: Where has it been and where do we go? Annual Meeting of the American Association of Geographers. Boston. MA. April 5-9, 2017.

- **Bednar, D.** (2016). Political Issues Surrounding the Orbital Debris Problem. Space Day at Western. Centre for Planetary Science and Exploration, Western University. London, ON. April 4, 2016.

- **Bednar, D.** (2016). Placing Issues of Space Politics into a Typology of Public Governance. Annual Meeting of the American Association of Geographers. San Francisco, CA. March 30-April 2, 2016.

- **Bednar, D.** McBean, G. & Shrubsole, D. (2016). Mapping the Governance of Climate Change Adaptation in Canada. Western University Department of Geography PhD Colloquium Series. London, ON. February 5, 2016.

- **Bednar, D.** McBean, G. & Shrubsole, D. (2015). Multilevel Governance and Climate Change Adaptation: Making Sense of the Literatures. Canadian Association of Geographers Ontario Division Annual Meeting. Carleton University, Ottawa, ON. October 24, 2015.

- **Bednar. D.** & Shrubsole, D. (2014). Geography, News Media, and Water Governance: A Case Study of the Devils Lake Outlet Dispute. Annual Meeting of the Association of American Geographers, Tampa, FL. April 10, 2014.

- **Bednar, D.** & Shrubsole, D. (2012). Devils Lake: Flooded American Homes vs. Canadian Environmental Risk? Centre for Environment and Sustainability 9th Annual Earth Day Colloquium. Western University, London, ON. April 13, 2012.

Poster Presentations

- **Bednar, D.** (2017) A Typology of Governance for Climate Change Adaptation. 4th Annual Ontario Climate Consortium Symposium, York University, Toronto, ON. May 11.

- **Bednar, D.** & McBean, G. (2016). What Does Collaboration Mean to Governments? Desires, Enablers, and Metrics of Collaboration on Climate Change. 3rd Annual Ontario Climate Consortium Symposium, McMaster University, Hamilton, ON. May 5.

Workshops and Panels Designed or Facilitated

- **2018** – Multi-Sector Panel on the Future of Canada in Space. Hosted by the Centre for Planetary Science and Exploration, Western University. London, ON. April 6.

- **2018** – Expert Insights on the Governance of Climate Change Adaptation in British Columbia. Hosted by Simon Fraser University and the Adaptation to Climate Change Team. Vancouver, BC. March 6.

- **2017** – Expert Insights: The Governance of Climate Change Adaptation in Canada. Hosted by Health Canada, Ottawa, ON. March 6.

- **2017** – Expert Insights: The Governance of Climate Change Adaptation in Canada. Hosted by Institute for Catastrophic Loss Reduction, Toronto, ON. March 3.

- **2016** – Robotic Rover Design and Task Completion (for kids). Western University Centre for Planetary Science CanMars Public Night. November 10.

- **2010** - Taking Geographers out of Geography? Academic Versus Popular Geography. Department of Geography Critical Reading Seminar Series. Western University, London, ON. November 12.

VOLUNTEER SERVICE

Conference Organization

- **2018** – Organizer and Chair: The Critical Geopolitics of Outer Space: The Democratization and (de)Politicization of Non-Earth Places. Paper Session. New Orleans, LA, April 10-14.

- **2017** - Organizer and Chair: Human Rights and Critical Geopolitics of Space. American Association of Geographers. Paper Session. Annual Meeting. Boston, MA. April 5-9.

- **2017** – Centre for Environment and Sustainability Conference Planning Team Member. EnviroCon at Western. March 8.

- **2016** - Co-Organizer: Critical Geopolitics of Outer Space. American Association of Geographers Annual Meeting. Paper Session. San Francisco, CA. April 2-March 4.

- **2016** – Centre for Environment and Sustainability Conference Planning Team Member. Western University Earth Day Colloquium. April 22.

Service to University and Community

- **2017 - Present** Volunteer Event Planner - Western University Society of Graduate Students Pride/LGBTQIA+ Commission

- **2015-2018** Co-Chair - Western University Space Science and Technology Community of Practice

- **2016** Community Liaison and Tree Planter - ReForest London.

- **2016** Volunteer Event Planner - Centre for Planetary Science and Exploration CANMARS 2016 Public Outreach

- **2014-2016** President - Department of Geography Graduate Students Society, Western University

- **2014-2016** Graduate Student Representative – Department of Geography Faculty Council

- **2015** President - Western University Karate Club

- **2012-2015** Commissioner & Founder - Department of Geography Wellness Committee, Western University

- **2014** Graduate Student Representative – Department of Geography Hiring Committee

- **2013** Graduate Student Representative - Centre for Environment & Sustainability Collaborative Program Administrative Committee, Western University

- **2010-2012** Public Service Alliance Canada Union Representative - Department of Geography Graduate Student Society, Western University

Editorial Service

- *Geopolitics* – Special Issue Guest Editor (*In Progress).*

- *The Canadian Geographer* – Invited manuscript reviewer

PROFESSIONAL DEVELOPMENT & TRAINING

2018 Space Generation Advisory Council
- Space Generation Congress Under-35 Global Delegate (1-100)
- 3 Day Intensive Conference and Working Group Session
- Report Submitted to the United Nations Committee for Peaceful Uses of Outer Space

2018 LivingWorks Mental Health Training
- Suicide Alertness Training (3 hours)

2018 Space Generation Advisory Council
- Space Generation Fusion Form Under-35 Global Delegate (1 of 50)
- 2 Day Intensive Professional Development and Networking Program
- Report Submitted to United Nations Committee for Peaceful Uses of Outer Space

2017 Foundation for Environmental Stewardship Certificate of Training
- Advocacy and Implementation: UN Sustainable Development Goals (8 Hours)

2016 - Present Western Social Science Continuous Teaching Improvement Community of Practice
- Co Chair and Facilitator

2015 Western University Teaching Support Centre Certificate in University Teaching
- Advanced Teaching Program – Completed
- Degree Duration Program – In Progress

PROFESSIONAL AFFILIATIONS

- Western University Centre for Environment & Sustainability
- Western University Centre for Planetary Science and Exploration (CPSX)
- Climate Change Adaptation Community of Practice (CCACoP)
- Canadian Association of Geographers (CAG)
- Association of American Geographers (AAG)
- Space Generation Advisory Council (SGAC)
- International Astronautical Federation (IAF)

LANGUAGES

- English (Proficient Reading, Writing, and Oral)
- French (Proficient Reading, Intermediate Oral and Writing)