

Policy Capacity and the Ability to Adapt to Climate Change: Canadian and U.S. Case Studies

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Abstract

This special issue contributes to extant empirical scholarship assessing governmental capacity to meet significant policy challenges, in this case those related to climate change adaptation. The study includes detailed examination of five policy sectors—finance, infrastructure, energy, forestry, and transportation—in two countries, Canada and the United States—in order to determine what kinds of governance arrangements and analytical capacities exist in this area, how they are changing (if at all), and how they interrelate with the status and evolution of climate change outcomes in each sector. The articles provide a comprehensive sampling of policy network structure and behavior, organizational mandates and resources, and actual job duties and training of policy actors across these sectors at both the federal and subnational level of government.

KEY WORDS: policy capacity, climate change, climate change adaptation, comparative public policy, policy networks, organizational mandates, policy work

Introduction: Shifts in Climate Change Policy Mandates and Their Evaluation

As governments shift from climate change mitigation efforts to approaches aimed at adaptation, the policy design and implementation challenges they face also change. That is, as they shift from the largely incremental changes to the status quo associated with mitigation efforts to grappling with the major socioeconomic, political, and technological challenges related to climate change adaptation, they must deploy capacity and organize responses accordingly (Lemmen, Warren, Lacroix, & Bush, 2008; Swart et al., 2009). This special issue contributes to empirical scholarship assessing governmental capacity to meet such challenges.

The study includes detailed examination of five policy sectors—finance, infrastructure, energy, forestry, and transportation—in the United States and Canada. It examines what kinds of governance arrangements and analytical capacities exist in each sector, how they are changing (if at all); and how they interrelate with the status and evolution of climate change policy-making processes and outcomes in each sector. Both countries are laggards in the realm of climate change innovation at the national and international levels, but have developed some new initiatives and plans at the subnational level. The essays and methods developed in this issue help to understand why this is the case, and thus are of use in helping to understand broad cross-national climate change policy dynamics. The cases are apt, given the multilevel governance structures in which climate change adaptation efforts occur. In each country (Dickinson & Burton, 2011; Rabe, 2007; Selin & VanDeveer, 2011),

and in order to capture differences in policy-making efforts and activities across jurisdictions in such complex multigovernmental settings, the articles in this special issue adopt a sectoral focus in exploring these issues. Each case provides a comprehensive sampling of policy network structure, organizational mandates, and resources, and actual job duties, training, and capacity across one of the four Canadian (finance, transportation, forestry, and infrastructure) and one American (energy) policy sectors explored.

The case studies are guided by efforts to answer two overarching questions: (1) do governments have the capacity¹ to design and implement the complex policy initiatives required for climate change adaptation, and relatedly, (2) are governance arrangements² and policy-making processes structured in such a way so as to facilitate complex policy making and achieve long-term climate change policy goals and objectives?

The study framework and subsequent analysis examine the issue in each policy sector through three discreet but interrelated levels of analysis: (1) the macro nature of the subsystem involved, (2) the meso level of the organization or lead agency in charge of the issue, and (3) the micro-level nature of policy work being undertaken by analysts.

At the macro level, analysis focuses on the structure and configuration of policy sector subsystems. It includes an assessment of the type and number of actors within the subsystem, the linkages among actors therein, and the centrality or “nodality” of the lead government department in relation to other network actors. This provides an overview of sectoral subsystem structures and potential shifts which have a direct bearing on governmental capacity to meet adaptation-related challenges. This is supplemented by meso—or policy sector case studies. This level of analysis facilitates identification of capacity gaps and remedial strategies related to how lead government agencies’ mandates and resources might have evolved in response to climate change adaptation. Finally, fine-grained micro-level examination of the policy tasks undertaken by analysts within each of the sectors is provided through quantitative survey analysis.

Combined, these three levels of analysis provide an improved overall picture of governance challenges and capacities through greater accuracy in the assessment of actual climate change policy capacity “on the ground.” Several of these policy sectors have been suggested to lack the requisite policy, analytical capacity, or integrative governance arrangements to respond effectively to climate change challenges and mandates (Dobuzinskis, Howlett, & Laycock, 2007; Riddell, 2007; Voyer, 2007). As Colebatch and Radin (2006) concluded in their study of the policy analytical activities in the United States, the UK, and European countries, significantly greater empirical research on the nature of policy work in specific contexts is needed for such evaluations. The authors emphasize the need for additional information on what sort of activity practitioners see as policy work, what sort of policy workers they recognize, and how this policy work is undertaken in particular sectors or issue areas such as climate change adaptation. And we need to know how those activities change in response to changing organizational mandates and governance arrangements. The articles in this issue respond to this call and help evaluate these claims. Further, the articles suggest how aspects of less effective policy can be reconfigured or amended to enhance

policy capacity and better respond to challenges associated with adaptation imperatives.

However, notwithstanding this advice, the findings in this issue are, in general, quite bleak. All of the sectors examined demonstrate weak or unrealized capacity. In the latter case, several longer-term institutional constraints are noted, such as constitutional structures, policy legacies, or changes in network positions which constrain effective deliberation, policy formulation, and action. Others relate to weak leadership, management, or mismatched or insufficient resources. Some of these challenges are more difficult to address than others. The in-depth examinations included in this issue help focus attention on what elements of existing policy regimes are susceptible to improvement and provide insights into opportunities to address these gaps. Finally, the framework and findings detailed in this issue provide opportunities for future comparative assessment.

Three Levels of Analysis: Subsystem Configurations, Governance Arrangements, and Policy Analytical Capacity

Modern policy analysis and design involve the attempt to improve policy outcomes by ensuring that decisions are taken with due regard to the state of available knowledge only once available options for government activity have been carefully and systematically assessed (Dror, 1967; Dunn, 1986; Radin, 2000).³ Exactly how this is accomplished is little studied. It can, however, be expected to vary substantially by policy sector and administrative unit to reflect the different “policy capacities” found in specific instances. The articles herein evaluate the issue of policy capacity at three levels—macro, meso, and micro, as described below—with the goal of better identifying and understanding the linkages and gaps between levels as well as how they may be overcome.

The working hypothesis of the project as a whole is that successful policy making in turbulent environments requires higher levels of analytical capacity and organizational resources if results are going to match or exceed shifts in organizational (lead agency) mandates. As the articles emphasize, however, these higher levels are not common in agencies tasked with climate change adaptation efforts.

Macro-Level Capacity Issues: The Evolving Nature of Density and Centrality in Subsystem Structures

It is essential for evaluations of policy capacity to take the contexts of governance arrangements, and the impact of changes to them, into account (Van Kersbergen & Van Waarden, 2004). Most of the studies contained in this issue assess the nature of governance arrangements pertaining to climate change adaptation through analysis of the kinds of interorganizational networks present in key climate change policy areas, using virtual policy network (VPN) technology and methods.

VPNs are informational networks created by Web-enabled policy communities whose political organizational forms have been transposed into the dedicated network structures of the Web. Policy dynamics originating in the real world shape information flows on the Web so that participation in Web-based information policy networks mimics the networked communication and organizational patterns of real

world policy communities (McNutt, 2008) with flows of information congregating around a specific policy field, issue, event, institution, or coalition (Rethemeyer, 2007). VPN analyses conducted in these studies apply simplified principles of social network theory to study relational data among Web sites. This methodology is particularly appropriate for the purposes of this study as opposed to the more standard institutional treatment, given the international scope of the policy issues involved. The inclusion of domestic and international actors within the sectors being examined and would make traditional network mapping exercises prohibitively expensive and time consuming to produce. Further, as is detailed below, VPN analysis facilitates generalizability across the sectors through consistent application of the method at multiple temporal periods.

Three key variables prominent in network analysis were used in the assessment of VPNs in all five sectors: density, centralization, and levels of internationalization (Borgatti & Cross, 2003; Burt, 1980, 1992; Granovetter, 1973; Hood & Margetts, 2007). Density and centralization are quantitative structural network variables that facilitate examination of the volume of information in each network (density)⁴ and the influence of the most connected node in the network as compared with the influence of all other nodes (centralization).⁵ “Internationalization” is a qualitative variable that measures the geographic influence of domestic and international actors within each sector’s network. This is particularly useful given the global scale of climate change adaptation policy. The method facilitates analysis of how domestic nodality may be impacted by weakening domestic positions within the sectoral networks fuelled by increased international activity (McNutt & Pal, 2011). These variables allow the population of the sectoral VPNs to be “mapped” and the relations among the actors therein to be analyzed.

At the macro level it is theorized that, generally, increases in capacity are required when density increases or centrality decreases, but not when centrality increases or density decreases (see Table 1). The macro-level VPN analysis conducted in the articles in this issue assess (1) into what quadrant the policy sectors being investigated fall (and whether the initial working hypothesis is correct); (2) what level of change has already occurred in the sector; and, therefore, (3) if additional organizational resources are required.

Based on documentary reviews, the initial positions of each sectoral case study were expected to fall into the quadrants set out in Table 2. With VPNs characterized by lower levels of centralization assumed to be poorly coordinated, suggesting greater capacity may need to be developed. Based on existing literature, surveys, and expert opinion, four hypotheses were subsequently tested: (1) increased

Table 1. Subsystem Structures and Capacity: Theory

		Density	
		Increases	Stable or decreases
Centrality	Increases	Stable—May require little additional organizational capacity	Enhanced—May have capacity surplus
	Stable or decreases	Decreased—May require additional capacity	Stable—May require little additional organizational capacity

Source: Authors.

Table 2. Subsystem Structures and Capacity: Empirics

		<i>Density</i>	
		Increases	Stable or decreases
<i>Centrality</i>	Increases Stable or decreases	Infrastructure Transportation and Energy	Finance Forestry

Source: Authors.

centrality and decreased density in the finance sector VPN; (2) decreased density and centralization in the forestry sector VPN; (3) density and centralization would increase in the infrastructure VPN; and (4) centrality would stabilize or decrease while density increased in the transportation and energy VPN. VPN analysis was conducted in each of the five sectors with an initial Web crawl in May of 2010 followed by a second additional crawl in each sector in May 2011 in order to capture these temporal dynamics.

This macro-level analysis is important as it provides a comprehensive overview of the governance contexts in each sector related to shifting patterns of government agency nodality and changes to the structure of the sectoral networks in question. The VPN analysis enables testing of the hypothesis related to the capacity of governments to deploy requisite capacity depending on their centrality in networks, and the density and internationalization of the networks within which they are associated. The articles in this issue reveal that nodality and internationalization across sectors have undergone significant shifts. Analysis of all the sectors confirmed two of the five macro-level hypotheses set out above. That is, support was found for those related to the infrastructure and transportation cases while those pertaining to the finance, energy, and forestry cases were refuted.

Overall, lead government departments in all sectors were found to be in weak nodal positions, leading the authors to conclude that such departments are not coordinating network activities efficiently. Each of the sectors analyzed was further marked by increasing network density and significant network decay. That is, the networks in each of the four sectors examined were found to be shrinking in overall populations and confined to a smaller number of key actors. In addition, high levels of internationalization and lower levels of subnational government activity were detected in three of the five sectoral networks studied. The articles in this issue provide detailed analysis for each of the respective policy sectors to elucidate these network structures and configurations and confirm the importance of a macro-level perspective on assessments and evaluations of policy capacity.

Meso-Level Capacity Issues: Shifting Organizational Mandates and Resource Endowments

Macro-level network analysis, however, only sets out which governance contexts require additional climate change capacity building in the five policy sectors under investigation. Exactly what kind of organizational arrangement exists in each sector is a second key meso-level component of policy analytical capacity (PAC). The supply and demand for analysis in each sector and lead agency, discussed next,

Table 3. Criteria for Assessing Policy Capacity: Theory

		Resources	
		Increase	Stable or decrease
Mandates	Increase	Challenging environment met by augmented policy analytical capacity	Likely ineffective policy capacity characterized by short-term fire fighting
	Stable or decrease	Enhanced policy capacity to meet long-term challenges	Weak policy analytical capacity contributing to propensity for policy failures

Source: Authors.

helps identify the potential for governments to be able to formulate and implement policies to meet evolving policy mandates such as those related to climate change adaptation.

Meso-level analysis conducted for each case study uses publicly available data gleaned from departmental annual reports and other similar sources. Assessments are undertaken as to potential lead government departments' resource changes (budgets and personnel figures) and adaptation-related shifts in official departmental mandates and program activity set out in official policy documents.

Table 3 usefully illustrates the effects of various combinations of resource levels and mandates responsibilities in any sector. It demonstrates the expected relationship between shifts in organizational mandates associated to climate change adaptation and the resources required at the organizational level to respond to such changes. In the turbulent environment which characterizes contemporary climate change policy making, mandates are generally expected to increase and that successful policy making requires that lead agencies be provided with enhanced capacity resources (budgets and personnel) in order to deal with these increases (Howlett & Rayner, 2006; Weber, Lovrich, & Gaffney, 2007).

Micro-Level Capacity Issues: Training and Activities of Policy Workers

The macro and meso analyses of policy capacity can be further improved through attention to micro-level issues related to the skills and training of policy workers in each of the sectors. Empirical studies of the actual behavior and performance of policy analysts in their jobs have consistently found that such actors undertake a variety of tasks and duties. For instance, process design and manipulation, outcome legitimation and political strategizing, as well as "objective" quasi-scientific, fact or "evidence-based" research and technical analysis of policy options (Colebatch, 2005, 2006; Hird, 2005; Page & Jenkins, 2005; Parsons, 2004; Radin, 2000).

Whichever "style" or mode of policy analysis is practiced,⁶ an appropriate level of PAC is required for them to be effective. As Fellegi (1996, p. 1) has argued, PAC can be considered to include, "... the whole gamut of issues associated with the government's arrangements to review, formulate and implement policies within its jurisdiction. It obviously includes the nature and quality of the resources available for these purposes—whether in the public service or beyond—and the practices and procedures by which these resources are mobilized and used."

At its most simple, at the micro level PAC can be measured by examining the interaction of three key organizational features such as: leadership, human

Table 4. Micro-Level PAC Determinants

PAC category	PAC factor
Organizational culture and structure	Organizational culture of openness and risk tolerance Promotion of innovative thinking in organization
Research demand	Market for research produced Rigorous research (withstands professional challenge)
Analytical supply	Educational background of employees of organization Organizational analytical resource integration ability Availability of quality data

Source: Authors.

PAC, policy analytical capacity.

resources, and organizational support. These aspects of PAC can be thought of as existing in a “production function” whereby the quality of policy advice provided depends on matching the “supply” and “demand” for policy analysis. Effective policy organizations are those that have the capacity to be able to anticipate in advance likely policy demands. This enables a consistently high standard of research methodology to be maintained, ensuring that possible solutions are not missed as a result of ad hoc analysis or “on the hop” research—doing only the best job possible in the (limited) time available. In turbulent policy environments, such as climate change adaptation, this is easier said than done. Changing mandates and policy goals, coupled with uncertainty, can create various types of mismatches between the supply and demand for high-quality analysis and its timely delivery.

Until now, little has been known concerning the supply and demand equation in the context of climate change adaptation. Building on hypotheses flowing from existing literature a variety of factors has been argued to be related to high levels of effective PAC (Fellegi, 1996; Howlett & Oliphant, 2010; Oliphant & Howlett, 2010). As per Table 4, these factors can be grouped within the three categories of organizational structure/culture, research supply, and research demand.

The first factor pertaining to high levels of PAC is how new ideas originate within an organization. Riddell (2007, p. 5), for example, has argued that “a culture in which openness is encouraged and risk taking is acceptable” strengthens the capacity of an organization’s policy research and analysis. Research suggests that PAC is strengthened when individual analysts have the freedom to take risks and create new and innovative programs or policies (Fellegi, 1996, pp. 14–15).

Demand side factors have also been suggested as crucial for effective PAC. Riddell (2007, p. 5) notes that a basic “markets” or demand for the research must exist. A second key demand variable will relate to the quality of research demanded. Fellegi (1996, p. 15) underscores that organizations that “formulate policies that can withstand rigorous professional challenge” are likely to have higher capacity, not simply because there is a demand for *any* research, but because those who are interested in the research and analysis are seeking a strong final product. Moreover, he suggests that the quality of research factor should also be contextualized by its relation to public expectations, noting that while prone to vacillation, stating that “the prime issue is the relevance and value of the work done . . . channeling public funds in the right direction and the avoidance of costly mistakes quickly justifies the cost of good policy work” (Fellegi, 1996, p. 13). Lastly, Fellegi (1996) and Anderson

Table 5. Criteria for Assessing Climate Change Policy Capacity among Policy Workers: Theory

		Training and Data	
		Adequate	Inadequate
Management	Strategic, evidence based Short-term, fire fighting	High capacity Demand constrained capacity	Supply-constrained capacity Low capacity

Source: Authors.

(1996) both argue that demand is affected by the orientation of management which impacts the nature and direction of the policy process.

Other factors highlighted in the literature can be grouped under the supply side of the equation. A requisite level of personnel with the appropriate analytic skill levels and training is fundamental to effective PAC (Riddell, 2007). Another supply side factor that has been noted is the presence of high levels of management skills and training (Peters, 1996). Furthermore, a key supply-side factor relates to the appropriate levels of analytical techniques employed by an agency's policy personnel (see Table 5). Ensuring that both the appropriate personnel resources and appropriate levels of analytical techniques are available can be assessed through evaluations of budgetary trends. Budgetary trends are indicative of resource availability which, in turn, indirectly testifies to the changing nature of an agency's PAC. Indeed, by listing budgetary constraints as a harbinger of the "erosion of policy capacity within the public service," Rasmussen (1999) highlights how the importance of a robust policy budget is best seen in its absence. Many of the aforementioned elements are related to another supply side factor, the organizations' ability to combine the use of different styles or techniques of analysis (Fellegi, 1996, pp. 14–15). A final supply side factor relates to the quality and quantity of the data produced by an agency. The question here is less of methods of generation but fundamentally that timely and appropriate data on a subject under consideration enhance the quality of the policy analysis provided (Gregory & Lonti, 2008). Together, these criteria form the basis for an assessment of this micro-level component of overall policy capacity.

At the micro level, two survey instruments were used to assess these factors. Wellstead conducted a Web-enabled survey of Canadian policy workers at the federal and provincial levels in 2010. The surveys were distributed to government policy workers in the four Canadian policy sectors included in the study (finance, transportation, forestry, and infrastructure).⁷ The analysis undertaken included a descriptive analysis and exploratory factor analysis from a sample of 636 usable responses (a response rate of 43.3 percent). The survey was designed to examine PAC and adaptation capacity in "natural resource" sectors (e.g., forestry) versus "non-natural resource sectors" (e.g., finance). These findings are integrated into the various articles providing fine-grained analysis through examination of the policy tasks undertaken by analysts in the various sectors.

This provides additional metrics by which capacity and potential shortages can be identified in each policy sector. For example, forestry sector respondents had the highest frequency of activity across all three task areas examined (briefing, consulting activities, and policy work). In contrast, those who worked in the infrastructure and transportation sectors were engaged more frequently in briefing type of

activity. The findings are also quite revealing in terms of variance between policy workers' self-perceptions of their organization's capacity for climate change adaptation and its perceived relevance to the day-to-day operation of the organizations. That is, almost half of the respondents stated that their organization had a "medium" capacity to deal with climate change adaptation and contributed to increasing the overall capacity to adapt to climate change. However, respondents also reported that while adaptation was relevant to their departmental mission, it was perceived as less relevant to the daily operations of their organizations.

The second micro-level assessment provides a cross-national comparative perspective on the subject by examining a fifth policy area, Colorado's energy and climate change policy sector. Through a unique Web-based study with data collected in 2011, based on a sample of 359 respondents (45 percent response rate), Elgin and Weible assessed the PAC of government as compared with the nonprofit and private sectors as well as to the research/academic community. Using five dimensions of PAC (Howlett, 2009), the study investigated the amount of research conducted and accessed, government capacity to map political landscapes, the ability of government to communicate policy-related messages, capacity of government agencies to articulate their medium- and long-term priorities, and finally the ability of government to integrate information into the decision-making stage of the policy process. In a similar fashion to the goals of the aforementioned Canadian survey, Elgin and Weible focus on an assessment of the activities that policy actors actually undertake at the individual and organizational levels. These policy activities were grouped into three general categories of information, administration, and political activity.

At the individual level, in the Colorado case PAC was found to be an important explanatory variable in information-related activities and in activities that blur research-administrative-political boundaries, including consulting the public and negotiating with stakeholders. At the organizational level, contrary to expected results, researchers were found to be most involved in conducting research and less involved in other activities. Actors from government, businesses, and nonprofits show more diverse and higher levels of activities. Whereas the study found that researchers possess some of the highest levels of PAC, other policy actor categories are nearly equal on some measures. The organizational capacity scale was shown to be the most consistent explanatory factor in the multivariate analysis. The authors conclude that such findings reinforce the argument that PAC operates at both the individual and organizational scales and that measuring both, along with network variables, is critical for understanding policy capacity in complex domains such as climate change.

Overview of Case Study Findings

As mentioned previously, the articles in this special issue are organized by sector, with each case study examining the three levels of capacity in a single policy domain.

In the transport sector, Newman, Perl, Wellstead, and McNutt investigate a situation in which the lead Canadian federal department, Transport Canada, has identified a range of potential policy options for climate change adaptation and

mitigation (Transport Canada, 2008). However, they find policy design in the sector to be complicated by multilevel governance issues. That is, federal and subnational government involvement in the policy sector causes barriers to, or uneven capacity for, policy reform in the sector.

The case study explores these relationships by examining the policy capacity of civil servants in the transportation sector in two provinces: British Columbia and Ontario. Research included both content analyses of official documents as well as primary interviews with policy managers in the relevant ministries. The policy capacity concept is used to qualitatively measure the effectiveness of instruments in advancing goals in the sector where established transportation policy paradigms may be incongruent with newer adaptation initiatives.

Newman, Perl, Wellstead, and McNutt contend that significant challenges exist in both jurisdictions due to the incompatibility of recent climate action policy goals with established policy goals and existing instruments. This incompatibility leads to policy layering (Kern & Howlett, 2009) whereby existing transportation policies create a particular bureaucratic constraint in which certain policy instruments are judged to be incompatible with established policy goals. The authors term such a result as “institutionalized policy inhibition.” Conflicting layers of policy goals and instruments also sharply constrain the available policy capacity to meet policy challenges. The authors argue that transportation policy options in both provincial cases are developed to advance an existing market-inspired paradigm: improving market competition, increasing private carrier revenues, and decreasing government intervention.

It is suggested that the long-standing market-based Canadian transportation policy paradigm initiated at the federal level, and mirrored provincially, has served to elevate market principles into core beliefs that orient future policy choices. The authors therefore conclude that capacity in the sector is constrained by the conflict produced through the layering of newer climate-related policy goals over existing market-based transportation policy and instruments. For adaptation efforts to be successful in this sector, the authors emphasize a need for them to either be reframed in accordance with the marketized transportation policy paradigm, or else be backed by the kind of political leadership required to successfully re-prioritize policy goals in a long-established policy regime.

In the infrastructure case study, Craft, Howlett, Crawford, and McNutt examine existing governance arrangements and PAC in a second situation where a clear lead agency exists at the federal level (Infrastructure Canada, 2006) but where provincial efforts are less significant determinates of policy outcomes. They provide a review of similar provincial activity in the sector and examine both “internal” capacity and the ability of alternative arrangements to address some of these issues (English & Skellern, 2005). The case study examines long-term policy and programming mandates that have typically been dictated by federal level leadership in the policy sector and newer policy tools such as public–private partnerships (PPPs or P3s),⁸ and economic and environmental stimulus funds which have emerged to develop, finance, and build infrastructure (Daniels & Trebilcock, 1996; Grimsey & Lewis, 2004).

Using the framework established above, the authors found significant shifts in mandate and departmental resources pertaining to infrastructure in Canada.

Three phases are discerned from 2000 to 2010: A pre-2002 phase consisting of departmental start-up capacity building; phase 2 (2002–2006) involving a growth in the federal departmental mandate and resource with a particular emphasis on infrastructure financing and sustainability at the cities and communities level; and a third phase (2007–2010) involving significant departmental budgetary increases along with greater interdepartmental and state–society partnerships for infrastructure programming. The authors emphasize the recent spike in departmental funding and clear mandate expansion in the context of economic stimulus spending and significantly in the climate change realm, through Green Infrastructure Funds. Department-wide funding increases have been mirrored by steady growth in departmental human resources which are tracked on a full-time equivalent basis. Closer analysis reveals, however, that the increase in overall personnel obscures a consistent shortfall of planned versus actual staff for policy, research, and knowledge-related program activity (Curry, 2012).

Moreover, the provincial level, the study finds little explicit infrastructure-related adaptation planning and programming. While strategic climate change plans or strategies exist across the board, the actual on-the-ground programming and spending related to infrastructure is generally undertaken through other ministries rather than infrastructure-specific ones. Craft et al. conclude that the infrastructure policy sector is thus characterized by very uneven patterns of PAC related to climate change adaptation. A shortage exists at both levels of government with respect to departmental human resource levels explicitly tied to policy analytic work. Second, while acknowledgments of the critical need for infrastructure adaptation are detected, limited additional programs and departmental expenditure explicitly tied to infrastructure and adaptive capacity are reported in practice.

The dominant feature of the Canadian forest policy sector in contrast to infrastructure for example, but similar to transportation, is the prominent role of subnational governments (Howlett & Rayner, 2001). In their case study, Rayner, McNutt, and Wellstead examine a situation in which governance of forest resources is almost exclusively under provincial jurisdiction even where forestry activities take place on private lands. Analytical capacity is thus likely to be uneven, depending on the relative importance of forest resources to each provincial economy. Climate change impacts in the sector, including, but not limited to, shifts in productivity, frequency of fires, and changing patterns of pest outbreaks, all require integrated governance arrangements and coordination (Johnston et al., 2006). Past studies have, however, found that forest policy suffers from low levels of integration primarily in large part due to the major role played by subnational jurisdictions (Beyers & Sandberg, 1998; Howlett, 2001) and the proliferation of new policy actors such as environmentalists and First Nations.

Indeed the findings of the VPN analysis are that the policy network in the sector has become more porous which has led to significant coordination problems (Howlett & Rayner, 2006). Although the federal government has attempted to use the National Forest Strategy, which relies largely on procedural and information instruments, as a coordination mechanism, these efforts have met with mixed success. A new national strategy (2011) identifies climate adaptation as one of two central elements of concern; however, the record of previous strategies in meeting targets on the ground is poor (Howlett & Rayner, 2007).

In the case study, Rayner, McNutt, and Wellstead find that both federal and provincial forest policy subsystems support the original meso-level hypothesis—that mandates are increasing but resources are stable or decreasing, leading to an overall loss of policy capacity. At the federal level, the forestry mandate of the lead department, Natural Resources Canada, has remained relatively stable over the last 5 years. The mandate has focused on three core activities: innovation, competitiveness, and communities. The authors note that the replacement of climate change reporting by the disturbance and adaptation theme represents both a broadening of the mandate itself and a move from a fairly fixed focus to a potentially more open-ended one. An analysis of two subnational jurisdictions (British Columbia and Alberta) finds that while mandates have in fact expanded significantly and ambitious adaptation-related policy goals have been articulated, they have not been matched by an increase in resources to meet such mandate shifts. In particular, resource shortage in both subnational cases was found to have occurred in response to challenges created from wildfires and deforestation due to pine beetle epidemics. The authors conclude, at the provincial level, that this mismatch leads to a serious erosion of policy capacity related to forest-related climate change adaptation.

Despite popular perceptions of relatively high analytical capacity in the finance sector (Coleman & Porter, 2003), Williams and McNutt find studies of governance arrangements in Canada to have raised doubts concerning relations among key policymakers and the ability of the sector to implement policy changes. Research has highlighted the role of federalism and the degree to which finance is a divided jurisdiction as mitigating effective policy design. Studies have also pointed to factors such as the Department of Finance's weak capacity for guiding policy given the high level of politicization over key policy debates in the sector (Harris, 2004), weak federal governance stemming from federal disinterest in Bank of Canada related to industry regulation (Coleman, 1996), and, given the predominant role of the provinces, a weak federal Office of the Superintendent of Financial Institutions (Roberge, 2005) in undermining effective policy making.

In their analysis of the sector, Williams and McNutt underscore the importance of political considerations such as the institutional and jurisdictional limitations of lead agencies as a fundamentally important determinant of adaptation capacity. The authors find PAC and governance arrangements in the finance sector to be integrated, except in those areas requiring federal and provincial cooperation and coordination. In those particular areas, governance arrangements are fraught with greater conflict and considerably less integration was found. These findings are supported in the sectoral VPN analysis which also suggests a central and dominant role for the federal finance department and agencies with important linkages to provincial and international organizations.

Micro-level analysis of survey data collected for the study finds a significant gap to exist between finance officials and nonfinance officials on awareness of, engagement in, and concern about, climate change adaptation issues. The authors use the illustrative case of the Office of the Superintendent of Financial Institutions to explore the dynamics at this level in the sector.

Finally, using the climate and energy sectors in Colorado as a case study, Elgin and Weible examine the PAC of government compared with other nongovernmen-

Table 6. Criteria for Assessing Climate Change Policy Capacity in Five Key Sectors

		Resources	
		Increase	Stable or decrease
Mandate	Increase	<i>Transportation</i> Challenging environment requiring augmented policy analytical capacity	<i>Forestry</i> <i>Energy</i> Likely ineffective policy capacity characterized by short-term fire fighting
	Stable or decrease	<i>Banking</i> Effective policy capacity to meet long-term challenges	<i>Infrastructure</i> Weak policy analytical capacity contributing to propensity for policy failures

tal cohorts working in the climate and energy sector and provide a cross-national comparison to the four Canadian cases discussed previously. The authors note that significant energy resources and a growing energy sector combined with the state's vulnerability to climate change make Colorado an ideal choice for assessment of the American response to climate change. Moreover, the authors' note that the municipal (Denver) and state (Colorado) plans are typical in comparison with the sets of city and state climate action plans in existence.

Elgin and Weible report on original survey data collected in 2011, finding that governments in Colorado have a mixed level of PAC, with high capacity in some areas, and considerably lower capacity in others. The authors conclude based on these results that state government is not as "hollowed out" as expected. In particular, the Colorado government was found to have sufficient capacity to communicate its policy messages to the public, and sufficient capacity to integrate relevant research and information into the decision-making stage of the policy process. However, the authors note that government was found to have lower levels of capacity to assess the opinions and attitudes of the public and stakeholders on climate and energy policy, as well as limited capacity to articulate its medium and long-term policy priorities. Respondents in both government and nongovernmental spheres strongly suggested that government capacity must increase to match challenges related to energy and climate change issues in the state.

Conclusions

The findings from these five studies suggest an uneven pattern among the sectors exists related to their current capacity to deal with climate change mandate changes. The case studies were found to be distributed much as expected at the macro level (Table 2). Assessed against the working hypotheses set out in Table 3, however, as Table 6 shows, at the meso level infrastructure was found to have departmental resources and mandate increased but these went unmatched by increases to PAC. In finance/banking capacity at this level was found to be high overall, although when specifically related to climate change the results were less reassuring.

Forestry was expected to demonstrate ineffective capacity given its decentralized nature and the few administrative resources devoted to planning in the area (Ruth, Davidsdottir, & Laitner, 2000) and this hypothesis was confirmed by the findings from the case study presented in this issue. The transportation sector was also found

to display low capacity and high levels of integration and therefore to be analytically impaired (Dudley, 2003). Meanwhile, governments in Colorado were found to have an uneven mix of PAC with high capacity in some areas but considerably lower capacity in others.

Taken as a whole, the articles in this special issue move us further toward the operationalization of policy capacity, and an understanding of its function in relation to the prospects for successful climate change adaptation. As this introductory article and the framework it has advanced emphasize, the ability of governments to meet the challenges of climate change adaptation in any given policy sector is contingent upon them having an appropriate configuration of macro (governance arrangements), meso (organizational resources and mandates), and micro (PAC) factors and the overview of the case studies provided here emphasizes the complex governance architectures that can impact the ability of governments to adequately respond to turbulent policy challenges like those associated with climate change adaptation. The framework of analysis and findings in the pages of this issue offer a useful point of reference for other jurisdictions and sectors attempting to meet adaptation challenges through improved policy design and implementation practices. Above all, they suggest that such efforts must pay due attention to the interaction of changing organizational mandates, resources, and network structures in assessing the ability and propensity for governments to lead or lag behind in efforts to deal with one of the most pressing and wide-ranging public policy issues of our time.

Notes

- 1 There are many competing definitions of policy capacity (Christensen & Gazley, 2008; Edwards, 2009; Parsons, 2004; Riddell, 2007). Honadle (1981), for example, defined it as “the ability to: anticipate and influence change; make informed, intelligent decisions concerning policy; develop programs to implement policy; attract and absorb resources; manage resources; and evaluate current activities to guide future action” (p. 578). Others, however, are more concerned with the ability of the state to respond to change (Weiss, 1998), the intellectual and organizational resources of the state (Cummings & Nørgaard, 2004), the management of knowledge and organizational learning (Parsons, 2004), or effective policy formulation (Goetz & Wollmann, 2001). Regardless of their specific orientation, however, all observers agree that policy capacity is a significant determinant and indicator of a high-performing government (Aucoin & Bakvis, 2005; Bakvis, 2000; Harrow, 2001; O’Connor, Roos, & Vickers-Willis, 2007; Painter & Pierre, 2005; Weber & Khademian, 2008).
- 2 At the national level, studies have focused on four basic or “ideal” types—legal, corporatist, market, and network governance—found in many jurisdictions and sectors in liberal democratic states (Considine, 2001; Considine & Lewis, 2003). Each mode—legal governance, corporatist governance, market governance, and network governance—has a different focus, form of control, aim and preferred service delivery mechanism, and procedural policy orientation. This thinking has reflected the general idea of governance arrangements, varying from steering via hierarchical, imperative coordination, to steering through reflexive self-organization (“plurilateralism”). This, however, represents only one key axis along which any effort to operationalize transitions in governance will be made (Cerny, 1993; Zielonka, 2007). The relative strengths of the public and private actors involved are also a key factor (Knill & Lehmkuhl, 2002) which can affect the ability of a government to decentralize or deconcentrate authority to nonstate actors, ultimately affecting the choice of policy instruments or regulatory techniques utilized in specific policy contexts (Daugbjerg, 1998; Haas, 2004; Harrop, 1992; Pontusson, 1995).
- 3 Policy analysis is a relatively recent movement, dating back to the 1960s and the U.S. experience with large-scale planning processes in areas such as defense, urban re-development and budgeting (Garson, 1986; Lindblom, 1958; MacRae & Wilde, 1985; Wildavsky, 1969). It represents the efforts of

- actors inside and outside formal political decision-making processes to improve policy outcomes by applying systematic evaluative rationality (Majone, 1989). Policy analysis texts usually describe a range of qualitative and quantitative techniques which analysts are expected to learn and apply in specific circumstances, providing advice to decision makers concerning ostensibly optimal strategies and outcomes to pursue in the resolution of public problems (Elmore, 1991; Patton & Sawicki, 1993; Weimer & Vining, 1999).
- 4 Determined by calculating the entire population of potential ties ($n(n-1)$ where n = all nodes) as compared with the actual population of unidirectional links ($m/n(m)$, where m = set of all edges or links).
 - 5 Network centrality is calculated through a summation of all inbound links received by an individual node divided by the number of inbound links received by the most linked to Web site ($(k(\max))/\Sigma m$, where $k(\max)$ = the node in the network with the highest in-degree and Σm = the aggregate summation of all inbound links).
 - 6 In a very useful study, drawing on European experience, Mayer, Bots, and van Daalen (2004) have outlined six elements of the analytical task—research, clarification, design, advice, mediation, and democratization—that can be combined in specific ways to produce six predominant styles of policy analysis—rational, client advice, argumentative, interactive, participative, and process-oriented—practiced in any sector.
 - 7 Four additional sectors were also surveyed: “climate change,” “environment,” “natural resource management,” and “water resource sectors.”
 - 8 Public-private partnerships span a spectrum of models that progressively engage the expertise or capital of the private sector. At one end, there is straight contracting out as an alternative to traditionally delivered public services. At the other end, there are arrangements that are publicly administered but within a framework that allows for private finance, design, building, operation, and possibly temporary ownership of an asset (http://www.pppcouncil.ca/aboutPPP_definition.asp).

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