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"Push" dynamics in policy experimentation: Downscaling climate change adaptation programs in Canada

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ABSTRACT

Policy experiments have often been touted as valuable mechanisms for ensuring sustainability transitions and climate change adaptation. However problems exist both in the definition of 'experiments', and in their design and realization. While valuable, most experiments examined in the literature to date have been small-scale micro-level deployments or evaluations of policy tools in which the most problematic element revolves around their "scaling-up" or diffusion. The literature on the subject has generally neglected the problems and issues related to another class of experiments in which macro or meso-level initiatives are 'scaled-down' to the micro-level. This paper examines a recent effort of this kind in Canada involving the creation of Regional Adaptation Collaboratives (RACs) across the country whose main purpose is to push national level initiatives down to the regions and localities. As the discussion shows, this top-down process has its own dynamics distinct from those involved in 'scaling up' and should be examined as a separate category of policy experiments in its own right.

Practical implications

Policy experimentation is becoming an important approach to developing and spreading climate change adaptation policies. Such experiments come in a variety of forms and are useful policy tools for governments with limited policy capacities to deploy in the face of an increasingly complex policy making environment. They provide a mechanism for ex-ante evaluation, can promote learning outcomes and provide timely policy relevant information on program success, or failure. In the absence of policy experimentation, policy managers and practitioners face the possibility of implementing poorly designed large-scale programs or being stuck in the *status quo*.

Typically, the policy experimentation literature has focused on policy experiments that have been "scaled up", that is, pulled from a micro-level pilot study to a more macro-level policy level. The importance of "scaling down" experiments or pushing broadly applied on-going initiatives to regional or local-level issues has been neglected in this field. Scaling down, however, is closely related to the concerns of many climate change adaptation practitioners who seek to 'mainstream' climate change into existing policies.

This paper goes someway towards filling this gap through a case study of scaling down policy experimentation in three Canadian federal government programs: Canadian the Climate Impacts and Adaptation Network, the Regional Adaptation Collaborative program and the National Adaptation Platform funded by the Government of Canada. Publically available government documents on these three successive programs such as reports, assessments, evaluations and audits were used in the analysis in order to determine under what conditions such top-down diffusion processes succeeded and when.

Examining the Canadian experiences lead to the following practical implications:

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1. Government organizations produce a great deal of scientific and technical knowledge. Downscaling policy experiments can bridge the gap between research and policy by creating an enabling environment for local initiatives based on this accumulated record of knowledge.
2. There is greater likelihood that the political feasibility of programs will already be established and will be less problematic in "push" activities rather than "pull" ones.
3. A centralized organization to foster collaboration and partnerships and to communicate project results is needed if top-down experiments are to be successfully diffused.
4. Key barriers and realistic policy solutions can be identified through top-down processes, just as they are in bottom-up ones.
5. Downscaling experiments promote multidisciplinary projects while upscaling them tends not to do so.
6. Communication between scientists and stakeholders is required if downscaling is to be successful and,
7. Local stakeholders play a pivotal role in the success, and failure, of downscaling efforts.

Introduction: scaling up versus scaling down in policy experiments

Policy experimentation has been acknowledged by many observers to be a useful policy tool to deal with complex and dynamic policy issues, including climate change. Different types of policy experiments including pilot projects have been conducted in many sectors and their results and experiences have provided useful insights to resource managers about the requisites of successful policy design. Without experimentation, as Ascher (2001) argued, the outcomes from deploying policy tools are likely to lead, at best, to a range of poor results, due to unintended consequences, the promotion of perverse incentives and other kinds of policy failures linked to the adoption of infeasible policy alternatives (Marsh and McConnell, 2010; McConnell, 2010).

Policy pilots may be scaled up in space, time or based on their purpose. But it should also be noted that diffusion can occur in one of two possible directions: scaling "up" from local or micro-level initiatives or scaling "down" from more senior, macro-level ones. That is, pilots and other kinds of experiments are not restricted to small scale pilots and the local level but can in other cases involve governments in the effort to translate broad strategic direction and general principles (often derived from science-based assessments) into more localized policies and/or to engage potentially affected local stakeholders in a top-down fashion.

Most research has focused on bottom-up or "pull" processes in which the experience of small scale and local pilots is generalized over time into programs with a larger ambit. Most of this literature on policy experiments to date has examined instances of substantive tool deployment and the small-scale micro-level employment or evaluation of such tools with the expectation that successful efforts may be generalized or "scaled-up" (Thrush et al., 1997; Hoffmann, 2011; Hartmann and Linn, 2007; Simmons et al. 2007; Callander, 2011; Spicer et al., 2014; Zhou et al., 2013). In these kinds of experiments, the most problematic elements focus on understanding why some experiments are "scaled-up" or diffused from the micro to the macro-level, while others are not. This literature has identified key factors such as the nature of political and administrative support for such initiatives and/or their technical merits in achieving policy goals as key variables affecting this process (Mei and Liu, 2013).

In large part because of the complexities, uncertainties and ambiguities of resource and environmental issues, however, governments have increasingly chosen to try to construct policy consensus through more engaged and interactive forms of policy making and to allow non-state actors to implement central or senior government policies within a broad framework of incentives, benchmarking and private governance (Sprinz and Vaahtoranta, 1994). Many of these efforts involve policy experimentation and pilot projects moving from the macro to the micro, rather than vice versa, and these kind of "push" experiences have been much less well studied and examined. The downscaling type of experiment has rarely been examined in the still relatively sparse literature on the subject of policy experiments.

In 2007, for example, under increasing pressure to address climate change in Canada, the then minority Conservative federal government rebuked previously existing international commitments made by its predecessors and sought to develop a "made in Canada" approach to reducing greenhouse gases. This came to fruition with the "Clean Air Regulatory Agenda" (CARA) and Bill C-30 (*Canada's Clean Air and Climate Change Act*). Under this legislation, among other things, the federal government provided nearly $86 million to programs intended to improve information access and technical expertise to facilitate climate change adaptation in Aboriginal and northern communities, to produce improved climate change scenarios to support risk assessment, and to further research and engagement to address health impacts of climate change in northern First Nations and Inuit communities (Henstra, 2015). An additional part of this agenda set aside funding to enhance "horizontal collaboration in climate change adaptation". The program that focused on this goal was the Regional Adaptation Collaboratives (RACs) led by Natural Resources Canada, which sought to enhance knowledge sharing networks located throughout the country by directly engaging provincial and municipal governments, industry, academia and NGOs in adaptation planning and decision-making.

This paper examines the creation and implementation of the Canadian Climate Impacts, Adaptation and Research Network, six Regional Adaptation Collaboratives (RACs), and the Climate Change Adaptation Platform in Canada. There, the main purpose has been to push national level adaptation to climate change initiatives to the regions and communities. Examination of publically available output (reports, workshop proceedings, management plans, presentations) of these three initiatives shows this top-down process has its own procedural governance dynamics and problems distinct from those involved in 'scaling up' and must be examined as a separate category of policy experiments in its own right. The strength in Natural Resources Canada experimental efforts has been focus on overcoming uncertainty in decision-making as well as addressing policy ambiguity (Cairney et al., 2016). The absence of political and policy research maybe the most significant barrier in downscaling efforts. Javeline (2014) pointed out that:

[p]lenty of ecologists, geologists, engineers, and other non-political scientists are working on climate change adaptation and drawing on their expertise in relevant ways, and there is no need to duplicate that expertise. Instead, we need to fill a huge gap. It is our own expertise in politics that is lacking and should be applied to the many critically important and unanswered political questions about adaptation (429).

Policy experiments in theory and practice

Experiments form a potentially useful policy instrument with which to manage such complex policy issues by aiding in ex-ante evaluation of policies, generating learning outcomes and policy relevant information under dynamic conditions (McFadgen, 2013). In the development sector, for example, experimental projects are frequently used to assess alternative courses of action. These include (1) projects that focus on problem definition by assessing evidence of "dissatisfaction or existence of a problem", (2) projects that focus on problems which are partly or wholly undefined, (3) projects that explore the most effective way of achieving pre-set policy goals, (4) projects that aim at identification of gaps and barriers in situations where problems and goals are already well-known and (5) natural experiments that occur over a period of time without conscious intervention (Rondinelli, 1993). Enhanced experimentation and consequent learning can also aid in adapting to the "dynamic drivers and expressions of risk" in a changing policy environment (O'Brien et al., 2012).

While the importance of pilots as a form of experimentation for pre-testing policies and programs is well-acknowledged, however, there exist several challenges in translating or 'scaling-up' of experimental projects which affect their diffusion with which the contemporary literature on the subject has grappled (Sabel and Zeitlin, 2012; Stoker, 2010). Political factors including the influence of diverse stakeholders, for example, have been found to impact scaling-up of policy experiments including pilots. Pilots might sometimes be used as an excuse to garner political acceptability, or maybe abandoned citing them as failures because the political milieu might not be conducive for it to move ahead. These political aspects of policy experiments including pilots are not very well researched. That is, the presence of multiple stakeholders and their power positions can also influence the scaling up process. Policy pilots came under much scrutiny during the late 1980s and 1990s in the development realm, for example, as these were often seen as being 'donor-driven', dependent on external aid and less focused on local priorities and engagement than they should have been (Nair and Howlett, 2016).

Many policy experiments also depend on political behavioral variables, making scaling up efforts more challenging as it requires an extrapolation of behavior observed at an individual level. While incentives can be used to regulate behavior to some extent, any mismatch of expectations or disagreement between stakeholders can impede the scaling up process despite successful results at the local level (Vreugdenhil, 2010; Vreugdenhil et al., 2012). If the experiments are challenging an established regime by suggesting innovative policy solutions and alternate pathways for resource management and transitions, collaboration between the key stakeholders is critical to break policy inertia and system lock-ins (Zhou et al., 2013).

The desire of senior governments to promote more effective local-stakeholder solutions has led many government agencies to increasingly consider how best to 'scale down' findings and recommendations such as the adaptation solutions found in large-scale climate change assessment reports. As with 'scaling up', 'scaling down' is often treated in an experimental fashion, in which initiatives aim to test out various processes and outputs that combine good practices in the implementation of the central policy principles with sensitivity to local conditions and the potential for broader policy learning. Unlike scaling-up, however, 'scaling-down' has some distinct characteristics, such as arriving with pre-approved political status and already allocated resources for implementation. Prima facie, this suggests the two aspects of the 'scaling' process are distinct from each other and care must be taken in inferring from studies of scaling-up to the situation of scaling-down.

Scaling down: the Canadian climate change experience

The examination of three national-level programs in Canada that has overseen and coordinated a number of down-scaling or mainstreaming climate change adaptation pilots, planning efforts, stakeholder forums, and community oriented research throughout the country. These case studies suggests that indeed this is a separate category of policy activity, which deserves more attention in its own right and should not simply be melded into studies of 'scaling-up'.

Early downscaling: Canadian Climate Impacts and Adaptation Network (C-CAIRN)

Following the1997 Kyoto Protocol commitments made by signatory countries to reduce greenhouse gas (GHG) emissions there has been a progression of programming efforts over the past 15 years is illustrated in Table 1 beginning with the Climate Change Action Fund (CAF) (Canada 2013). In response the Canadian federal government's Department of Natural Resources (NRCan) established the Climate Change Action Fund (CCAF), a three-year $150 million initiative in 1998.[1] The focus of the CCAF funding was on mitigation related research and activities[2] but a modest Science Impacts and Adaptation (SIA) program ('block') was established to undertake mostly impacts-related research (Canada, 2000). At the program's conclusion, a departmental audit and evaluation concluded that "the Impacts and Adaptation block increased understanding of the potential impacts of climate change and options to adapt [...] and 80 percent of the impact study projects reviewed filled a knowledge gap in this area. It also increased the awareness of the importance of this type of research. The majority of Impacts and Adaptation projects have good potential to contribute to planning and policy development" (Natural Resources Canada, 2005). Much of this research was highlighted in the 2004 national adaptation assessment.

In addition to increased awareness a second lesson was learned and highlighted by NRCan policy and planning staff who were responsible for project planning and research coordination during the program's implementation. They noted the policy relevance of these projects, but concluded that "more research on the relevant topics needs to be conducted before the results could be used to create new policies" (Natural Resources Canada, 2005).

Concurrent to the CCAF funded adaptation research program, NRCan's Climate Change Impacts and Adaptation Division developed the Canadian Climate Impacts and Adaptation Research Network (C-CIARN) program in 2001. The $8.25 million program, which ran from 2001 to 2007, was divided into six area[3] and seven sector-based[4] "nodes" with the intention of developing "cooperative climate change impacts and adaptation research projects, on-the-ground operational trials, and the communication of research results through workshop, seminars, discussion forum, newsletters, websites, and other education and awareness programs" (Canada, 2003, p. 4).

Each of the nodes was provided with between $100,000 and $125,000 of operating funds and they were housed in organizations

[1] The funding was extended for another three years.

[2] The CCAF was originally structured into four blocks of activity: Foundation Analysis; Science Impacts and Adaptation (SIA); Public Education and Outreach (PEO); and Technology Early Action Measures (TEAM).

[3] British Columbia, Prairies, Ontario, Quebec, Atlantic, and North.

[4] Agriculture, Water Resources, Coastal Zone, Health, Forest, Landscape Hazards, and Fisheries.

Table 1
Canadian climate change adaptation research and policy activity.

Year(s)	Initiative	Description
1998-	Climate Change Action Fund	$150 million program implemented by Environment Canada and Natural Resources Canada
2001–2007	Climate Change Impact and Adaptation Network (C-CIARN)	$8.24 million capacity building funded by NRCan and implemented by six regional and seven sector "nodes" under the Action Plan 2000 program
2004	Climate Change Impacts and Adaptation: A Canadian Perspective (2004) assessment report	Focus on impacts, vulnerability, and adaptation
2007	2007–2011 Federal adaptation funding	$85.8 million over four years ($35 million to NRCan) Government's Federal Adaptation Policy Framework
2008	Clean Air Agenda	$1.8 Billion with 85.6 million for adaptation
2008–2012	Regional Adaptation Collaboratives (RACs)	Six RACs created with each focused on a particular climate change vulnerability
2008	From Impacts to Adaptation: Canada in a Changing Climate (2008) assessment report	A regional focus on adaptation related research and on the drivers of adaptive capacity.
2011	Federal Adaptation Policy Framework	$148.8 million over five years ($35 million to NRCan)
2014	Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation assessment report	Focus on decision-making and barriers
2012-present	NRCan Adaptation Platform Regional Adaptation Collaboratives II (RACs)	Continued focus on scaling down decision-making initiatives Sector and regional emphasis on "mainstreaming" policies and policy barriers

that included universities (e.g., University of Guelph), non-profits (e.g., OURANAS), and federal government agencies (e.g., Canadian Forest Service). The overarching goal of the C-CIARN program was, procedural in nature, namely to develop a network of researchers and stakeholders in order to keep up with growing demands for information to feed adaptation policy development and increase awareness and engagement of decision-makers (Natural Resources Canada, 2006, 2011). In total, 135 research projects were undertaken. In terms of coordination, the nodes relied mainly on workshops, newsletters and email messages to bring researchers and stakeholders together (Natural Resources Canada, 2006).

The end-of-program evaluation[5] found that although C-CIARN had been 'fairly successful' in engaging the scientific community in the impacts and adaptation research, it "had less success in involving other important stakeholders, particularly policy and decision-makers from other orders of government" (Natural Resources Canada, 2006). In other words, the gap between policy-relevant research and policy outputs identified in the SIA evaluation remained unfilled. There were three major recommendations stemming from the evaluation. First, future research was to move beyond vulnerability and address the integration of science into policy. Second, C-CIARN was to be redesigned into fewer "results-oriented" nodes that would work more closely with provincial, municipal and industry partners. Third, the evaluation advocated greater policy engagement of adaptation issues within NRCan to achieve integration of impacts and adaptation concerns into programs and policies.

Regional Adaptation Collaboratives: explicit downscaling

Following the conclusion of the C-CIARN program, there was a call to establish Regional Adaptation Collaboratives (RACs) across Canada Led once again by Natural Resources Canada's (NRCan's) Climate Change Impacts and Adaptation Division, the $30 million Regional Adaptation Collaborative program initiative was designed to "catalyze coordinated and sustained adaptation planning, decision-making and action" (NRCan, 2014). This represented a shift to a greater emphasis on procedure tools than in the C-CIARN program.

A national call for proposals was made in 2008. The two main criteria were that the RACs were to "focus on one or more key vulnerabilities of region and clearly be able to advance to adaptation decision making stage by [a] program end-date" (Spencer, 2008). The RAC program signified a shift in "focus from research to adaptation action" and "create an enabling" environment for local adaptation action (NRCan, 2011). Once local adaptation actions have taken place, the RAC would facilitate the 'scaling up' of the lessons learned across Canada:

Specifically, RACs design local projects targeted to decision makers that integrate adaptation measures into regional planning, policies and programs. The development of region-specific knowledge and tools such as community development plans, building practices, and water and resource management are then shared across regions and sector to accelerate adaptation planning and decision-making nation-wide (NRCan, 2011).

Three of the collaboratives (Prairies, Ontario, and Quebec) were holdovers from the C-CIARN program and the remainder (North, British Columbia, and Atlantic) were new (Table 2). The program was to be focused on decision-making and a wider collaboration between the federal government and provinces and territories, local governments, communities, industry, business, academia, and Aboriginal and non-governmental organizations.

The rationale for taking a scaling down approach that adopted by substantive and procedural tools was that the region-specific impacts of climate change create differences in the capacity to adapt by communities and local level stakeholders. Well-known measures of adaptation investigated by the RAC were: the timing (anticipatory, concurrent, reactive) of adaptation actions, their intent (autonomous, planned), the spatial scope (local, widespread) and their form (technological, behavioural, financial, institutional, and informational) (Rayner and Jordan, 2011). The overall nature of the evolution of these activities is set out in Table 3 below.

One of RAC's program goals was to include a range of stakeholders in order to understand and overcome the challenges of adopting critical adaptation measures. Collaboration was an explicit feature both in "accessing and applying the information and tools to support adaptation decisions and addressing barriers" (Spencer, 2008). In the lead up to the program's launch, NRCan staff stated "collaboration is our primary mechanism to advance climate change adaptation" (Spencer, 2008).

The four expected outputs of each collaborative were: options, recommendations, guidance for governments and practitioners; management and community plans; case studies and pilot projects; and technical and science reports. With the exception of the Northern RAC, all of this output was made publically available online. Table 4 presents some examples of the hundreds of projects undertaken over the three-year course of the program. As a collaborative undertaking, some projects were undertaken by provincial government departmental staff while in other cases non-

[5] Based largely on a review of projects and key informant interviews.

Table 2
Regional Adaptation Collaboratives (RACs).

Regional Adaptation Collaboratives	Coordinating Organizations	Focus Areas	NRCan funding (millions of dollars)[a]	Number of Partners
Preparing for Climate Change: Securing British Columbia's Water Future	Fraser Basin Council British Columbia Ministry of Environment	Water allocation and use Forestry and fisheries management Flood Protection Community adaptation	3.8	18
Prairie Regional Adaptation Collaborative*	Prairies Regional Adaptation Collaborative	Water supply and demand Drought and flood planning Forest and grassland ecosystems	3.3	10
Ontario Regional Adaptation Collaborative*	Ontario Ministry of Environment	Extreme weather risk management Water management Community development planning	3.3	10
Regional Adaon Collaborative – Quebec*	Ouranos Inc.	Built environment and infrastructure Water management Forestry, agriculture and tourism sectors	3.7	20
Atlantic Climate Adaptation Solutions	Atlantic Climate Adaptation Solutions Association	Community planning for food and coastal areas Groundwater protection Enhancing capacity of practitioners	3.7	66
Northern Regional Adaptation Collaborative	Government of Nunavut, Department of Economic Development and Transportation	Vulnerability assessment of Nunavut's mining sector to climate change Documentation of good environmental practices for Northern exploration and mining	0.4	5

From Natural Resources (2011)* overlap with the C-CIARN program.
[a] This was funding was matched by the RAC organizations.

Table 3
Evolution of Climate Change Adaptation Downscaling Programs.

	C-CIARN (2001–2007)	RAC I Program (2009–2012)	National Platform and RAC II program (2012-present)
Scaling	Implicitly down-scaling	Explicitly down-scaling	Down-scaling and up-scaling Sector level
Focus	Initiation and specification of climate change adaptation issues	Continued specification through greater mobilization and expansion through collaboration	"Mainstreaming"
Main Actors	Academic and government researchers	Provincial and territorial officials, NGO organizations, municipalities	Senior official from federal and provincial/territorial governments, and industry organizations
Governance	Largely decentralized across 16 regional and sectoral nodes with a goal of engaging the research community	More centralized Focused on specific vulnerabilities with defined project outcomes Inter-organizational networks	Centralized under the direction of a plenary Part of larger program effort (National Platform)
Policy focus	Agenda setting Adaptive capacity (systems based) Research capacity	Implementation of networks Climate specific impacts on policies (planning, assessments) Identification of policy barriers Programmatic level "mainstreaming" Collaboration capacity and stakeholder engagement	Re-focus implementation (Downscaling) Policy formulation and policy design (Upscaling) Policy capacity Policy mechanisms

governmental agencies were contracted to lead projects. Often, private consultants and academics produced a variety of reports and other outcomes.

The RAC and Tool Synthesis working group's responsibility was to provide "a forum through which value-added RAC and Tools products can be identified and developed" (NRCan, 2013). The proposed outputs included guidance documents and decision support tools, methods (e.g. evaluation of risk), opportunities and vulnerability assessments, targeted capacity building, engagement, identification of barriers, drivers and opportunities for adaptation, and the identification of information needs and data availability and gaps. The RACs were to broaden and connect the outcomes with the priority sectors in the affected regions through targeted and strategic activities. These activities needed a more formal coordination mechanism and it would be provided by the creation of the Adaptation Platform.

In 2012, at the conclusion of the program, each RAC submitted a "Lessons Learned" document to NRCan. The lessons learned through the RAC process from Quebec and the Prairies are set out in Table 5 below. Both RAC reported the need to focus on the need develop policy instruments and tools to address regional level climate change challenges. By highlighting the importance of creating, providing, and the diffusion of information to policy actors, the impacts of the procedural tools received considerable attention in the evaluations. For example, the Quebec RAC favored a governance structure that would foster collaboration and partnerships and better communicate project results.

Adaptation platform: the next generation of downscaling

The RACs ultimately continued but were absorbed into a national "Adaptation Platform" which was part of Natural

Table 4
Examples of RAC Outputs.

Regional Adaptation Collaborative	Options, recommendations, guidance for governments and practitioners	Management and community plans	Case studies and pilot projects	Technical and science reports
Preparing for Climate Change: Securing British Columbia's Water Future	Participatory Flood Management Planning in Delta	Fraser Interior Watershed Adaptation Planning	Fraser Basin Community Adaptation Case Study: Prince George	Agriculture water demand model: Report for the Nicola Watershed
Prairie Regional Adaptation Collaborative	Adaptation to Climate Change on the Canadian Prairies Forum	Moose Jaw River Watershed Drought and Excessive Moisture Preparedness Plan	Water Soft Paths (WSP) in the Pembina Valley Conservation District	Hydro-Climate Modelling of Alberta South Saskatchewan Regional Planning Area
Ontario Regional Adaptation Collaborative	Barrie in a Changing Climate: A Focus on Adaptation Final Workshop Report	A Climate Change Adaptation Strategy for the Lake Simcoe Watershed: The planning process	The City of Sudbury and the Nickel District Conservation Authority (NDCA) pilot	Implementation of a Map-Based Heat Vulnerability Assessment and Decision Support System Data Documentation and Protocol for Maintenance and Updating
Regional Adaptation Collaborative Quebec	Workshop on a systems implementation process of vegetated source control of storm water (SVCSEP) across the municipality or district. Quebec City	Coalition of basin organizations slopes of Quebec (ROBVQ) management plans	Planning adaptation based on local actors' knowledge and participation: a climate governance experiment	Impact of climate change on urban drainage systems: existing case studies
Atlantic Climate Adaptation Solutions	Local Government, Sustainability and Climate Change A Resource for Elected Municipal Officials in New Brunswick, 2012	Climate Scenario Development for ACAS Communities in Nova Scotia	Nova Scotia's Municipal Climate Change Action Plan Guidebook: Yarmouth pilot project	Newfoundland Coastal Vulnerability Assessment

Table 5
Examples of Lessons Learned by the RACs.

Quebec
A centralized regional body to foster collaboration and partnerships, to communicate project results
The need to establish of procedures for promoting multidisciplinary projects
The development of searchable database of projects to be used by policy-makers
Greater communication between scientists and stakeholders is required
Greater feedback from local stakeholders on research studies needed
Policy impetus from provincial governments is critical
Identification of barriers to adaptation policy
Prairies
More vulnerability and risk assessments are required for mainstreaming efforts
Improved monitoring
Need to develop strategies for promoting stakeholder awareness of climate change issues
More climate change consideration in planning efforts
Encouraging further experimentation and innovation

From Bleau and Bourque (2013), Rescan (2012).

Resources Canada's $35 million program, "Enhancing Competitiveness in a Changing Climate" (Henstra, 2015). It followed the earlier RACs' goals and sought to "understand better why to act and how to do it by learning from those in our sector or region who have done so already. Sharing those experiences, whether through case studies or peer-to-peer networks, can provide a powerful push to adaptation action" (Natural Resources Canada, 2013). To do so, approximately 40 senior representatives from federal departments (Natural Resources Canada, Environment Canada, Aboriginal Affairs and Northern Development, Transportation Canada), provincial departments, RACs, and industry organizations were invited to establish a plenary that sought to undertake six activities (develop guidance documents and decision support tools, develop methods of practices and evaluation, undertake risk, opportunities and vulnerability assessments targeted capacity building and engagement, identify barriers, drivers and opportunities for adaptation and identify information needs and data availability and gaps (Natural Resources, 2013) (Fig. 1). Eleven working groups involving nearly 250 experts were tasked with undertaking 85 projects (Natural Resources Canada, 2014).

An interesting development with the RACs and the National Platform displayed above was thus how they eventually grew to involve *both* scaling down and scaling up efforts. By 2012, there was a shift to an up-scaling focus with the creation of Natural Resource Canada's Adaptation Platform. Its governance differed considerably from the RACs program with a centralized 'Plenary' consisting of senior members from federal government departments, provincial and territorial governments, national industry and professional organizations that met biannually "to identify critical and emerging adaptation priorities" (Natural Resources Canada, 2013) (Table 6).

Policy implications and conclusion: taking scaling-down seriously

The use of experimentation by practitioners and resource managers as a tool for effective policy design under complex and dynamic conditions has been well-acknowledged both in theory and practice (Stoker, 2010; van der Heijden, 2013). Pilot projects

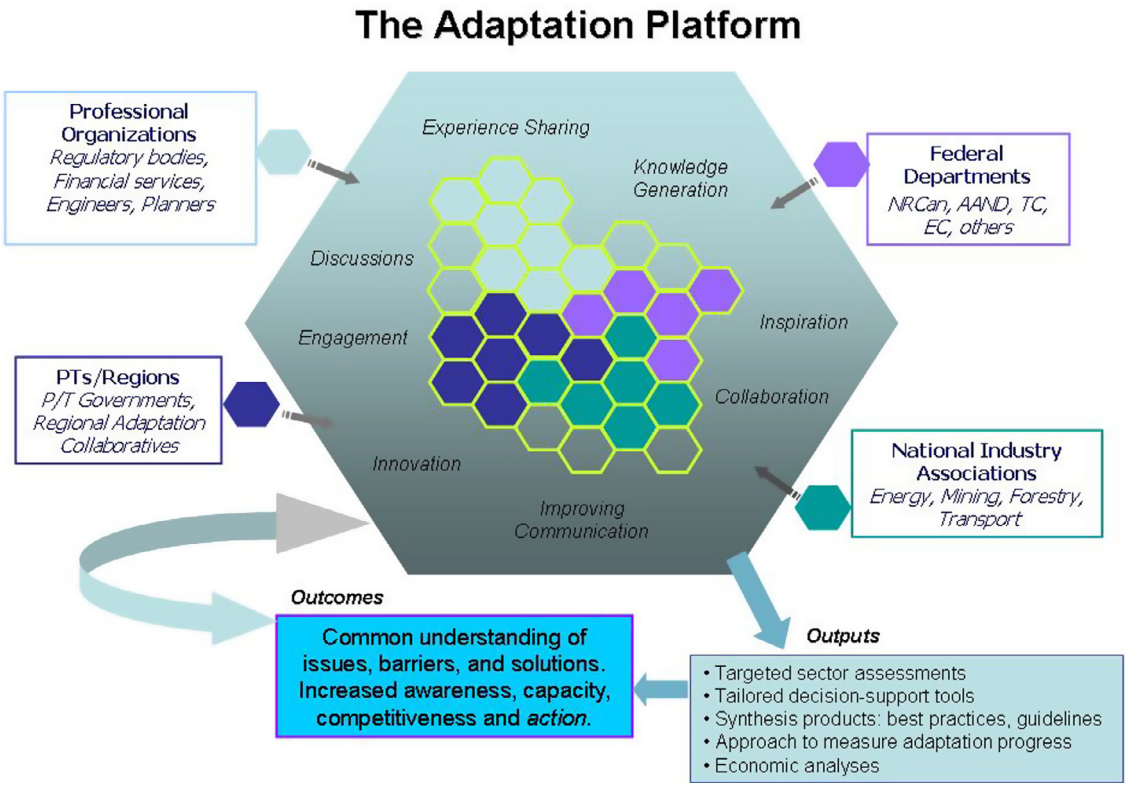

Fig. 1. The Adaptation Platform. From: Natural Resources Canada (2013).

are a common mode of policy experimentation and a widely used method to introduce major government policies or programs in a phased manner, allowing them to be "tested, evaluated and adjusted" beforehand (Cabinet Office, 2003). For issues such as water resource management policy experimentation, for example, pilot projects have played an important role in exploring alternate courses of action when faced with long-term uncertainty (Nair and Howlett, 2014, 2015).

Existing studies have generally neglected the problems and issues related to both procedural tools and to experiments in which macro or meso-level initiatives are '*scaled-down*' to the micro-level; that is, in which they already have general political support and resources. Scaling down, however, is particularly significant in areas such as climate change policy, where initiatives often begin by developing broad strategic direction and overarching principles, such as a clean air act, and then attempt to "apply" them in an open-ended way to concrete circumstances such as control of specific emissions problems. Other problems with procedural tools, in particular, which may, as in this case, empower participatory policy-making at the regional level which is expected to in turn impact policy deliberations and development at the local, individual and firm levels, among others, are also poorly understood.

Within academic and practitioner circles, the importance of "mainstreaming" climate change adaptation is frequently raised in large-scale assessment frameworks. Simply put, mainstreaming involves integrating climate adaptation measures into existing policies and programs through a form of "scaling-down" various pilot projects and policy processes to the local level (Lim and Spanger-Siegfried, 2005).

There have been numerous climate change adaptation assessments and frameworks, be they at the international, national, or subnational levels, that address the problem associated with climate change impacts vulnerabilities (O'Brien et al., 2012). Although assessments produce a vast wealth of information, more information about risk, vulnerabilities, and the corresponding resilience of at-risk communities will not necessarily lead to better policies especially when addressing a complex issue such as climate change adaptation (Geyer and Rihani, 2010). It has been noted that these studies are strong in their analysis, but extremely weak on the policy implications of their analysis (Wellstead et al., 2013, 2014).

The ability of sectors to adapt to climate change through "push" processes has thus become an issue of concern reflected in national and sub-national level sectoral plans for adaptation. How to develop these plans and what factors or variables to include and account for in order to achieve policy goals are, however, uncertain. Determining both what *should* be done and what is *feasible* in present circumstances is of great significance to both analysts and practitioners and many vulnerability assessments and climate change adaptation policies have turned to policy experiments in order to help develop realistic initiatives.

The goal of the innovative and collaborative approach to climate governance that emerged through the RAC process was to "create an enabling environment for adaptation, where decision-makers in regions and key industries are equipped with the tools and information they need to adapt to a changing climate" (Natural Resources Canada, 2014). Designed specifically to find ways of bridging the gap between research and policy, the RACs can thus be viewed as process pilots (Jowell, 2003) because they attempt to address climate change issues "by targeting local and sustainable adaptation planning and decision-making" (Natural Resources Canada, 2014). That is more data and information will not equip decision-makers to adapt to a changing climate. Future downscaling and upscaling efforts need to incorporate unpre-

Table 6
Adaptation Platform Working Groups and Outputs.

Working Group	Objective	Projects (Examples)
Coastal management	Increase understanding of the impacts of climate change on economic, human and cultural coastal assets and potential adaptation responses	Impacts of climate change and physical constraints resulting from coastal squeeze in the Gulf of St. Lawrence, and evaluation of adaptation measures Assessment of the Risk to PEI's Coastal Residences, Infrastructure and Heritage from a Changing Climate Risk Assessment Framework for Coastal Bedrock Aquifers
Economics of adaptation	Create economic knowledge and tools that help decision-makers in both the private and public sectors make better adaptation investment choices and policy decisions	Economic Assessment of Climate Change Impacts and cost-benefit analysis of adaptation options in coastal areas in Quebec Adaptation Strategies to Climate Change Induced Low Water Levels in the Great Lakes Basin: a Cost Benefit Analysis Regional economic impact studies and Adaptation to Climate Change: The St. Lawrence River A Study of Economic Impacts on the Weather Effects of Climate Change on Vulnerable Communities
Energy	Advance adaptation and increase resilience to a changing climate in the electricity and oil and gas sectors	Evaluating Opportunities and Implications of Integrating Adaptation and Mitigation Programs within the Energy Sector Understanding the Current State of Awareness and Action on Adaptation in the Electricity Generation, Transmission and Local Distribution Sector Climate Change Impacts to the Oil and Gas Sector – Are we prepared? Resilient Pipes and Wires: The Impact of Climate Change on Electricity Infrastructure Investments: A National Perspective
Forestry	Address sustainable forest management in the context of a changing climate	
Infrastructure & Buildings	Build capacity, generate evidence and provide outreach to increase the capability of infrastructure managers, municipalities, builders, insurers, engineers and other relevant stakeholders to adapt and facilitate adaptation to climate change	Quick Response Program Cities Adapt to Extreme Rainfall Best Practices for Management of Inflow/Infiltration in New Urban Developments IDF CC Tool: Updating IDF curves to account for climate change impacts
Measuring progress in adaptation	Improve the ability of decision-makers to measure progress in the implementation and effectiveness of adaptation	Analysis of indicators in climate change adaptation used in countries of the Organisation for Economic Cooperation and Development (OECD): the case of coastal management Measuring Progress: An analysis of indicators used in seven Canadian sectors and their transferability to adaptation Best Practices in surveying for the measurement of climate change adaptation Measuring Progress: An analysis of indictors used in four Canadian sectors and their transferability to adaptation
Mining	Address information gaps while developing tools and information that will help the sector to adapt	Economic Impacts of a Changing Climate on the Operations and Reclamation of Mines A comparison of proactive and reactive approaches Economic Implications of Climate Change Adaptations for Mine Access Roads in Northern Canada Development of Climate Change Economic Case Analysis for the Mining Sector Climate Change Impacts and Adaptation Mining Survey
Northern regions	Provide northern decision-makers with the information and tools necessary to advance adaptation	Baseline Analysis of Mainstreaming Adaptation into Natural Resources Development Activities in the Hudson Bay Inland Sea Region Climate risk assessment of transportation requirements for the MB-NU supply chain Risk assessment of key buildings and infrastructure in Ross River, Yukon, related to permafrost degradation
Regional Adaptation Collaborative and Science assessment	Science assessment Improve how science assessments in Canada are developed, how they are communicated, and how they are used	Community-related Adaptation Resources Compendium and Guidance based on RAC and Tools Program Products Sea Level Rise Primer Version 2 and Companion Materials British Columbia Regional Adaptation Collaborative Case Studies
Tools synthesis	Provide a forum through which value-added RAC and Tools products can be identified and developed	Develop assessment reports on Canada's marine coasts and on Canada's transportation system Undertake a survey of decision-makers to better understand what they are looking for in science assessments Present findings of assessments in products targeted to specific audiences
Water and Climate Information	Provide improved access to an inventory and tools for water and climate information products to support adaptation in Canada	Development of a climate data guide book to assist in selecting and using historical climate information to support adaptation to climate change in Canada Development of a draft report to articulate the status and challenges of climate services in Canada

Natural Resources Canada (2014).

dictable policy making environment made up of many actors, notions of power, competing interests and beliefs, and unpredictable events. Better understanding efforts at scaling-down as a class of policy experiments can help efforts in this regard.

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