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Authors: Kimberly J. Reeder, Susan O'Donnell, & Adrian Prado

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Leadership for Climate Change Adaptation In a Rural Region in New Brunswick, Canada

Kimberly J Reeder
University of New Brunswick
Fredericton, New Brunswick, Canada
kreeder@unb.ca

Susan O'Donnell
University of New Brunswick
Fredericton, New Brunswick, Canada
susanodo.unb@gmail.com

Adrian Prado
Northwest Regional Service Commission
Saint-Joseph-de-Madawaska, New Brunswick, Canada
a.prado@csrno.ca

Abstract

Many rural communities across Canada are experiencing or anticipating climate change effects. Our study, a contribution to the limited social science research on adaptation in rural regions in this country, focused on a rural, forest-dependent, francophone region of New Brunswick on unceded Wolastoqiyik territory. In collaboration with a regional governance organization, we developed and administered a survey to gather the perspectives and experiences of rural community leaders on climate change adaptation. The study results are intended to provide a basis for discussion to support regional adaptation planning. They may also be used as a baseline for measuring future advances in climate adaptation efforts. Theories of new social movements, Indigenous resurgence, and organizational leadership informed our investigation and analysis. Our study focuses on three themes identified in the literature review critical to supporting environmental action: leadership, communication processes, and relationships. Our core research question is: To what extent are community leaders in the rural study region engaging in these functions? We conclude with reflections on how climate change adaptation is occurring in this rural region and the role of regional governance in this process.

Keywords: rural, climate, adaptation, leadership, Wolastoq

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1.0 Introduction

Eastern Canada's longest river, *Wolastoq* (the Saint John River), rises in rural Maine in the United States and flows into Canada at the rural northwest corner of New Brunswick. The river continues its journey down the centre of the province through many rural communities, and, finally, enters the Atlantic Ocean at the Bay of Fundy. At the end of April 2019 and into May 2019, *Wolastoq* flooded her bordering lands for the second year in a row. Emergency measures were implemented in the communities along the river, including in the cities where two of the authors work.

Thousands of New Brunswickers living near the river scrambled, again, and more than 1,000 residents had to leave home because it was unsafe to remain there. As we write this, some of our friends and neighbours are grappling to find solutions that will protect their homes and families from future floods. Questions remain about the extent to which the floods were related to climate change and the extensive clearcuts that contribute to the historical alterations and loss of biodiversity of *Wolastoq's* watershed.

Three weeks before the 2019 flood began, Environment and Climate Change Canada released a report confirming that Canada's climate is warming at a rate twice as fast as the global average. The "urgent wake-up call" (Environment and Climate Change Canada, 2019, para. 6) recommended the development of climate change adaptation plans across the country (Bush & Lemmen, 2019). The Intergovernmental Panel on Climate Change (IPPC) defines "climate change adaptation" as "adjustments in human and natural systems, in response to actual or expected climate stimuli or their effects that moderate harm or exploit beneficial opportunities" (IPCC, 2001, p.708). Mitigation confronts the causes of climate change; adaptation deals with the consequences. The federal government's position is that: "Adaptation is essential to reduce the damages from climate change that cannot be avoided" (Richardson, 2010, p.3).

Similar to Wall and Marzall, whose 2006 work focused on investigating capacity for climate change adaptation in a Canadian rural community, we believe our work will also advance the discussion of adaptive capacity in rural settings. While Wall and Marzall (2006) developed and used a quantitative framework for their explorations of rural climate adaptation, we believe our integrated assessment will engage rural community leaders in assessing and enhancing their ability to collaboratively adapt to climate change. Our work also expands the research of Keskitalo, Klenk, Bullock, Smith, & Bazely (2011) with rural communities in Canada and Sweden. Their work highlighted the importance of governing systems, particularly multi-level systems under stress from long-term climate stress and event-based disturbances. We infer, as did Keskitalo et al. (2011), that barriers to addressing climate change are proactively linked to limitations within multi-actor institutional structures; lack of coordination among multiple players, and lack of leadership, can contribute to less effective planning and action. Reed, Scott, Natcher, & Johnston (2014) suggest that although analyses of affective adaptation and climate mitigation have identified the importance of individual actors, institutions, and organizations within communities, research is lacking on how the internal dynamics of these institutions and organizations may affect local adaptive capacity. We aim for our work to advance a more robust theoretical understanding of adaptive capacity in rural regions.

Our study explores leadership for climate change adaptation in northwestern New Brunswick, where *Wolastoq* enters Canada from Maine, a rural area in a rural province. New Brunswick's government has been slow to react to the climate crisis in concrete ways, but public support is growing across the Atlantic region for climate action. Residents of both New Brunswick and Prince Edward Island recently elected a record number of Green Party members to their legislatures. At the time of writing, students in all the Atlantic provinces were rallying on a regular basis as part of the international climate strike movement. In February 2019, Edmundston, the largest urban area in the region studied, was the first city in New Brunswick to declare a climate emergency, followed by Moncton and Saint John (outside of the study area) several months later.

The study region's local and municipal governing bodies are legally mandated to be members of the Northwest Regional Service Commission (CSRNO). Regional Service Commissions (RSC) are a regional level of governance throughout New Brunswick developed in 2013. CSRNO is a partner in this study. On the CSRNO board are elected representatives from two types of communities: incorporated municipalities (towns and cities), and outlying, unincorporated areas. This article refers to the latter areas as 'communities'; they include settlements, which are individual homes, clusters of residences, or both. Although several non-profit organizations and municipalities in this region are involved in climate change adaptation activities, CSRNO employs the only full-time climate change adaptation staff person in the region, and in any RSC in the province. Our analysis suggests that CSRNO, originally developed to encourage and facilitate regional collaboration, may be the best positioned organization in the study area to improve the coordination of climate change adaptation planning in the region. Though the two Indigenous communities in the region are politically autonomous, they and the staff at CSRNO have established working relationships and are included in our study.

Our study data were gathered in a survey of community leaders in CSRNO's forest-dependent northwest region. Survey questions asked about the leaders' perspectives and experiences of climate change adaptation. Respondents work in every community within the CSRNO region and, in addition, the two Wolastoqiyik communities of Tobique and Madawaska, which pre-date provincial and regional boundaries. Theories of social movements, Indigenous resurgence, and organizational leadership informed our overall approach, and our results provide insight into leadership, communication practices, relationships, and local mobilization processes. The theoretical analysis may assist regional actors in advancing mutually beneficial relationships between Indigenous, regional-level state, and community actors in climate change adaptation planning and actualization initiatives. While our study focused on the rural northwest corner of New Brunswick, Canada, the insights derived increase understanding of the role of leadership in regional climate change adaptation more widely.

2.0 The Rural Northwest Region of New Brunswick

The CSRNO region includes an area of 7,985 km^2 in rural northwest New Brunswick (see Figure 1). It borders other rural regions in the Province of Quebec and the US state of Maine. The Wolastoqewiyik, an Algonkian-speaking Indigenous nation of the *Waponahkewiyik* (Wabanaki) Confederacy, have lived here for many millennia before European contact. They identify with *Wolastoq* and for centuries were able to gain their livelihood from *Wolastoq*, her surrounding lands, and their bounty (Perley, 2019; Tremblay, 2018).

With the arrival of the Acadians in the late 1600s, the expansion of Loyalist settlements into the territory by the 1830s, and the railway in the late 1870s (Zelazny et al., 2007) the well-established subsistence societies of the *Wolastoqewiyik* were under enormous pressure to integrate into the new colonial world order. Settlers' diseases decimated the Indigenous population. The new capitalist forestry and agriculture-based economies not only forced changes to Indigenous relationships with the natural world but also were the state's raison d'être to impose permanent settlement of the *Wolastoqewiyik* starting in 1787 (*Madawaska v R*, 2012). Today the two First Nation communities in this region remain on only a small part of their unsurrendered and unceded territory defined by the Peace and Friendship treaty

relationship with the Canadian state; both are leading their communities through a period of resurgence and revitalization.

Figure 1. The Northwest Regional Service Commission (CSRNO) regional government jurisdiction, highlighted in relation to the Province of New Brunswick, Canada.
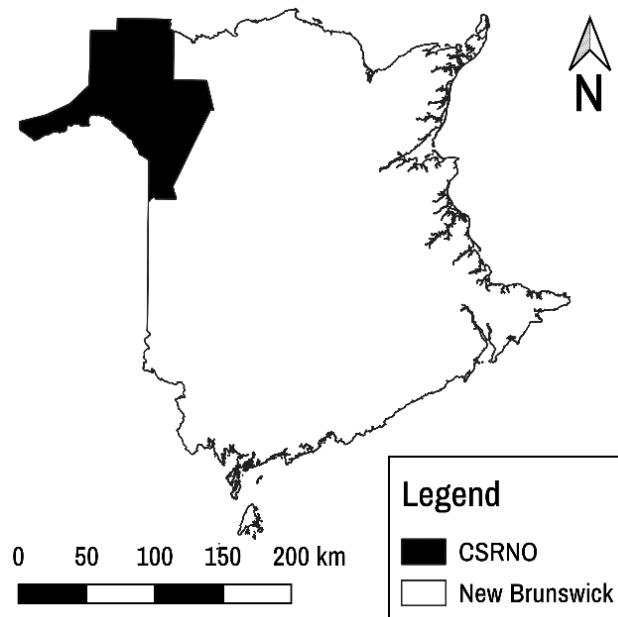
Source: Adrian Prado, CSRNO, 2020.

Tree harvesting and agriculture altered the original lands of this region starting most significantly in the 1700s, and few old-growth mixed forests remain (Zelazny et al., 2007, p.8). *Wolastoq* and her tributaries were restrained by dams; of the six dams restricting *Wolastoq* in this region, five generate power, and one retains water for eventual use in power generation. Some Indigenous people today blame the high rates of cancer in their communities on the toxic chemicals dumped and sprayed on their land by the publicly-owned NB Power. Their dams eroded the community's riverbanks, leading to "trees being washed away and homes in danger of falling into the river. Many of the edible and medicinal plants are gone – the islands where the plants grew are now underwater" (Thau-Elaff, 2009. p.1).

Currently, 83% of the population in this region speak French at home, and 18% speak English (Canada Business, 2019). Most residents have roots in both the Acadian and Québécois cultures, and many view themselves as having a distinctive culture. However, despite this homogeneity, within the region, many still identify primarily with their parishes and counties, both of which are historical administrative structures lacking governance. For example, those living in Madawaska county often describe themselves as "Brayons" or "Républicains" (republicans) for the fictional Republic of Madawaska (Couturier, 2002), which some scholars argue may be an artificial concept created in the 1920s to promote social cohesion (Volpé, 2015). Regardless of their origin, such sub-regional affiliations remain important in northwestern New Brunswick even today. In recent

years there have been significant efforts to foster the feeling of inclusion in a concept known as *l'Acadie des terres et forêts* (Acadia of the Land and Forests), which includes part of Québec and northern Maine, but excludes much of the CSRNO region (Core Leadership Team, 2015).

The region is crossed by the Appalachian range that runs from the Gaspé Peninsula in Quebec, through New Brunswick, into Maine and further south. The largest city, Edmundston (pop. 16,580), is situated at the confluence of the Madawaska river and *Wolastoq*. Current land use in the region is approximately 80% forested, 10% land cleared by forestry in various states of regeneration, 6% agriculture, 2% infrastructure (roads, bridges, power lines, and rail), 1% residential, 0.3% industrial buildings, yards and quarries, and finally, less than 0.1% set aside for recreational use and non-arable land (New Brunswick Department of Energy and Resource Development, 2016). Healthcare and Social Assistance is the largest (17%) employment sector, with manufacturing (15%) the second largest (Canada Business, 2019). The area's top three employers are the Province of New Brunswick (1,500 employees), Groupe Savoie Inc., a hardwood product manufacturer (500 employees) and Twin Rivers Paper Company Inc. paper and a pulp mill (350 employees) (Canada Business, 2019). Two hydro-electric energy producers also operate in the region, the provincial NB Power and Énergie Edmundston, one of three independently-operated power generation companies in the province.

3.0 Resilience and Climate Change Adaptation in the Region

The CSRNO region includes 24 communities (incorporated and unincorporated areas) with a current total population of 48,450. Six percent are Indigenous (First Nation) people (Canada Business, 2019). About 90% of the population has been in the area for three generations or more, which may be considered a determinant of resilience to climate change. Strong social and familial networks increase trust and strengthen communication within a community, essential during recovery (Carpenter et al*.,* 2012). Of families in private households, 14% are single-parent families (Canada Business, 2019), which can be more vulnerable in emergency situations. About 30% of the population are sole occupants (Canada Business, 2019); this situation can provide some agility in response situations but may also make adaptation or recovery a slower process due to limited household funds. Many of those responsible for household maintenance are older than 55. Although most residents have maintained their health into their late 50s and early 60s, their ability to keep up with household maintenance is declining. As well, most people over 65 years are likely on a fixed income, limiting their ability for large household investment or repair, if and when disaster strikes. The average household income is $72,942, and the median income $55,043, higher than many other regions of New Brunswick (Canada Business, 2019). This bodes well for the region as both statistics are above the poverty line; impoverished people frequently lack an effective means of escape and insurance, and often cannot protect themselves prior to a severe weather event, even in basic ways like stocking up on food (Ahmed et al., 2012).

Work on climate change adaptation began in the region in the mid-2000s. In 2016, the New Brunswick Environmental Network hosted a conference in the region at which the Regional Service Commission, CSRNO, was identified by the conference participants as a potential host for a regional climate change adaptation initiative. CSRNO staff developed a successful application for provincial funding, and the CSRNO board (the elected representatives of the 24 CSRNO member communities)

approved the hiring of an Environment and Climate Change Adaptation Specialist in 2017. In developing their first funding application, CSRNO staff identified several opportunities: tackle a problem that was gaining acceptance with governments and funding agencies at all levels (local, regional, provincial and national) and develop a project to access regional funding by municipalities who are members of the CSRNO. The organization, like many RSCs, is still dealing with limited long-term funding for their regional work. Concurrent to the RSCs first climate-based application, the Province released the 2017 McKendy report, *Improving the Regional Service Commissions (RSCs) in New Brunswick*, in which climate change adaptation planning was identified as a potential new service opportunity that the RSCs could provide to member communities. Since this first application, the CSRNO has received additional provincial funding annually for climate change adaptation.

4.0 Theories of Environmental Action

As researchers and champions of environmental action, we attempted with our study methodology to understand how climate change adaptation work can be best supported in this region, and what role the CSRNO organization might adopt in this process. We considered theoretical approaches relevant to the local rural context. Work in other rural francophone regions in the province and neighbouring Quebec provided guideposts. In 2007, a team at multiple universities affiliated with the Université du Québec studied climate change adaptation in rural coastal regions of the Acadian Peninsula of New Brunswick and the lower north shore of the St. Lawrence River in Quebec. Authors Plante, Chouinard, and Bernatchez (2007) used a systems approach and community development theories to understand how various actors developed strategies for climate change adaptation. Their work highlighted the need to look at organizational theories and the relationships between state actors and other regional stakeholders, including the role of leadership. In a similar study, Chouinard, Plante and Martin (2008) used community engagement to document how rural coastal communities in New Brunswick perceive climate change, local impacts and adaptation. Other similar research involving communities in rural francophone regions in New Brunswick and Quebec also used community-based methodologies and community development theories to ground their work, including the work of Simard (2018) within the rural Quebec region of Témiscouata. Our work builds on this research, widening the pool of available data and resultant analysis.

Our study considered new social movement theories that inform our larger research project of which the current study is a part (O'Donnell, Glynn & Perley, 2018). New social movement theory is not new but rather emerged to analyse collective identities and sites of action other than class, which is considered "the old social movement of proletarian revolution associated with classical Marxism" (Buechler, 1995, p. 442). The environmental movement has been widely studied using social movement theory (Castells, 1996). Alberto Melucci (1996) is a highly cited Italian sociologist far removed from rural New Brunswick; however, we believe his work on social movement leadership is relevant to our work. Melucci's analysis focuses on how leaders in the movement link different actors together. Leaders mobilize movements and support organizational structures for action. Crucial to the organizational function is sharing information among the different movement actors and maintaining a positive perception of the movement's aims and goals. Information informs and motivates the different actors in the movement, mobilizes a base of support, and helps the different network actors keep focused on the tasks and

increase their investment in the goals. Applying Melucci's theories to environmental action means exploring leadership, communication processes, and relationships.

The rural region we are studying in New Brunswick exists on unceded and unsurrendered *Wolastoqewiyik* territory. New social movement theory is limited for analyzing Indigenous leadership and environmental action, and theories of settler colonialism are more appropriate. Many Indigenous scholars, as well as investigators from the United Nations, have documented how colonialism has decimated Indigenous communities (UN Human Rights Council, 2014; Bear-Nicholas, 2015; Palmater, 2011). However, documentation by Indigenous leaders in the region confirms that leadership and relationships are also appropriate frames for understanding how change occurs in local Indigenous communities. The two First Nations in the region—Madawaska and Tobique—and their representative leaders are in negotiations with the federal government to ensure respect for their treaty rights and land claims agreements. A recent presentation by the leadership of the Madawaska Maliseet First Nation (Bernard & Bernard, 2019) identified that having stable community leadership was the key factor supporting the economic resurgence of their nation; notably, the community has been led by an all-woman Chief and Council since 2007. According to their land claim report, Madawaska Maliseet First Nation (2018) has a good relationship with the neighbouring municipal government of Edmundston. Tobique First Nation settled a major land claim in 2016 and has a direct-action approach to protecting their lands and communities (Tobique First Nation. (n.d.); Diabo & Pasternak, 2011). Tobique community leader David Perley (2019) has also identified strong leadership as the key to future stability and revitalization.

5.0 Organizational Leadership for Climate Change Adaptation

The three theoretical areas we considered in this study-community development, social movements, Indigenous resurgence—have a common focus on the importance of organizational and community leadership as well as communication processes and relationships to support action on the environment. CSRNO is the umbrella organization for the communities in its all-rural region and is undertaking its climate change adaptation work within a precarious regional political context. The Regional Service Commission (RSC) model was introduced in 2013, envisioned as a vehicle to provide services and facilitate coordination and planning on a regional basis in New Brunswick (McKendy, 2017). Some cost-savings and communication aspects of the RSC model have been quite successful, however, other aspects plague the RSCs, including being established incongruently with the Province's county borders, electoral and health regions; lacking a clear framework; having an ineffective structuring of member communities; institutional and territorial fragmentation; unclear roles and responsibilities; questionable or insufficient resource allocation; dependence on outdated provincial legislation; and the struggle of member communities between the desire for prescriptive guidance versus self-determination (McKendy, 2017; Klenk, N. L., Flueraru, D., MacLellan, J. I.*,* 2017; Klenk, N. L., MacLellan, J. I., Reeder, K., & Flueraru, D., 2018). Given these considerable challenges, effective leadership will be required for successful climate change adaptation activities.

As cited in Meijerink, S., & Stiller, S. (2013), a considerable body of research exists on leadership for climate change adaptation in Europe, the US and Australia, including theories of eco-leadership (ELT) (Allen et al., 1998; Wielkiewicz &

Stelzner, 2010) and leadership in social-ecological systems (Folke et al., 2005; Olsson et al., 2006). Some research, including Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Gorddard, R., Withycombe, G., & Morrison, C. (2011), has focused specifically on local municipal planning, highlighting how leadership can serve as a constraint or enabling mechanism for achieving climate adaptation depending upon how leadership is actualized. For our current study, we centred on research by Sander Meijerink, a specialist in water governance in the Netherlands, and his research colleagues (Meijerink & Stiller, 2013; Meijerink, Stiller, Keskitalo, Scholten, Smits & van Lamoen, 2015).

6.0 Study Methodology

Our study focuses on the three themes identified in the literature review critical to supporting environmental action: leadership, communication processes, and relationships. Our core research question is, 'To what extent are community leaders in the rural study region engaging in these functions?' Our analysis then reflects on how climate change adaptation is occurring in this rural region and the role of CSRNO in this process.

We gathered the data for our study through a survey of municipal and community leaders in the rural region. We included both elected leaders and staff working for the 24 communities, understanding that our results would identify other leaders and groups needing to be engaged. The survey protocol was reviewed and approved by the research ethics board of the researchers' home institution. Our survey questions explored the theme areas—leadership functions, communication processes, and relationships—as well as grounding questions asking perceptions and observations of climate change and organizational capacity for climate change adaptation. Respondents had the choice to respond in either French or English. Working with CSRNO, we developed 29 questions, mostly quantitative but also open-ended questions for respondents' comment input. Most questions allowed multiple response options to capture a range of observations about extreme weather events, climate change, organizational and communication practices, relationships with local organizations and others. Three questions used a four- or five-point Likert-like scale with an "other" option, and one question used a three-point Likert scale (agree, neutral, disagree). The original template for most questions was adapted to the local environment from research discussed in the literature review, and none were previously validated. After the survey questions were verified as culturally appropriate by representatives of both the Tobique and Madawaska First Nation communities and tested through a small pilot study, CSRNO recruited the survey participants through highlighting the survey (formally and informally) during various conversations and meetings with its board, (the elected leaders of communities within the region) and followed up with an email invitation and direct link to the survey. We administered the survey over a five-week period in March and April 2019. No participant incentives were provided. The average time to complete the survey was 38 minutes. Note that most survey responses were received before the start of the 2019 flood period affecting the region. A profile of the respondents is included in the findings section.

Our overall research approach is guided by the concept of "desire-centred" research. This form of research focuses on understanding complexity; rather than highlighting only the negative elements of reality, it encourages the researcher to dive deeper and to temper real hardships with the more holistic view, inclusive of wisdom and hope

(Gingrich-Philbrook 2005, as cited in Tuck, 2009). Tuck (2009) promotes the use of desire-centered frameworks as a replacement for "damage-centered" research that looks for negative aspects of communities in the false belief that by identifying the damage, reparations will follow. Tuck proffers that damage-centered frameworks may lead to negative outcomes for researched communities, while desire-based frameworks will enable synthesis and renewal. Although Tuck is writing for Indigenous and inner-city communities, her analysis and approach are useful for all marginalized communities, including rural communities.

7.0 Survey Results

7.1 Profile of Respondents and their Climate Change Work

Our invitation for participation was sent by the CSRNO to its member communities and elected leaders of Indigenous communities. We asked those invited to participate to share the invitation with those *they* identified as leaders. This snowball-type invitation provided us with additional responses from leadership within the local health system, the local Royal Canadian Mounted Police (RCMP) detachment, and local contacts from various provincial departments. This snowball survey method does not allow calculation of a response rate; however, based on survey data, we are confident the survey responses represent the experiences and perspectives of the region's government leadership as a whole and that the respondents are very familiar with the region.

Our survey received responses from 57 rural community leaders in the region. Respondents were based in at least 12 communities (half the total), including the two First Nations. However, several respondents worked in more than one community resulting in all 24 communities being included in the results. The pattern of responses matches closely the population of each of the communities. Almost half of the respondents identified as senior administrators, about one-fifth as planning or infrastructure staff, and the remainder as office or administrative staff or other roles. Two-thirds have lived in the region for more than 20 years or their entire lives.

More than 90% of respondents agreed that they are concerned with the impacts of climate change, and about 80% are concerned with the impacts of extreme weather events. When asked which weather-related events concerned them, 86% identified flooding, and 81% identified changes in winter precipitation. The majority also indicated that new patterns of heat waves and wind storms had been experienced and were important. Regarding socioeconomic concerns related to climate change and extreme weather events, 79% of respondents cited increased insurance costs, 67% an increase in school closures and event cancellations, and 44% an increase of health concerns or impacts to citizens such as heat stroke, falls, asthma, climate grief or depression. Finally, when asked about biophysical impacts observed in the past decade, 72% pointed to increased erosion, 73% identified increased algal blooms, and 52% noted decreased water levels in watercourses (compared to the same seasons within the past decade).

When asked about their awareness of their own organization's climate change and extreme weather efforts, 59% reported having general knowledge but acknowledged they might not be aware of all activities. One quarter reported they knew exactly what was going on within their organization, and 11% indicated they were not aware of their organization's efforts on these matters. Several provided examples of current undertakings.

Only a small minority of respondents reported that their work portfolio primarily focused on resolving issues related to climate change or extreme weather events. For most, less than half of their work is attentive to these issues, and 16% is reportedly spending no work time on them. Comments recorded by participants who chose the 'other' category included, "very little," "5%," "sporadic and as required," and "indirectly."

Just under half of the survey participants believe their organization has an appropriate response to climate change or extreme weather issues, while more than a third believe their organization is not doing enough. Thirteen percent did not pass judgement, choosing the 'I don't know' response. However, 6% chose the progressive, 'we're leading the pack' response.

7.2 Leadership Roles

Our first survey theme was leadership related to adaptation planning, with two main survey questions. We used an adapted version of Meijerink and Stiller's (2013) Leadership Function framework to develop these inquiries. Their framework distinguishes between various leadership functions, which together contribute to climate change adaptation: the political–administrative, adaptive, enabling, connective, and dissemination functions. Each function requires the execution of specific leadership tasks (Meijerink & Stiller, 2013). The first leadership-themed question was, "Many people may not realize they are helping find solutions to issues related to extreme weather event and / or climate change. Reading the options below may help you identify ways you are assisting. Which of these, if any, describes your role regarding these issues? Check all that apply." The available answers were formatted in two columns: the tasks they performed during adaptation planning (proactive), and during or immediately after an extreme event (reactive). Table 1 illustrates the responses (% of n) for each type of leadership and category.

When proactively planning, more than half of respondents reported leadership roles and tasks related to each leadership function including political-administrating, disseminating, enabling and connecting. For the reactive functions, political-administrating was the most common type of role identified and the other roles and tasks were less commonly performed.

For our analysis, we focused on the enabling and connecting leadership functions, as associated tasks are core to our investigation of leadership, communication processes, and relationships. As illustrated in Table 1, more than half of the respondents have performed at least one of four connecting and enabling tasks (asterisk), and almost half have performed at least one of two related tasks (italics). All the task options are listed in the table.

For the second leadership question, participants were asked to identify the resources they believed would most improve their organization's planning for extreme weather events and climate change. The survey categorized 28 optional resources into four categories: leadership, financial, knowledge and legalities, and community and communication.

Of the respondents who chose leadership resources (n=49), more than half identified the need for: better planning (policies, zoning, bylaws, etc.) (78%); more support from elected officials and administrators at higher levels of government (65%); and regulatory pressure or a legal mandate from higher levels of government (57%).

Table 1. *Performance of Leadership Roles and Tasks in Response to Slow-onset Climate Change (proactive) and Short-term Extreme Weather Events (reactive).*

Type of leadership	Leadership task	% (n=55)	
		Proactive	**Reactive**
Political - administrating	Develop new ideas and practices	72.7	32.7
Political - administrating	Identify problems	69.1	48.1
Disseminating	Convince people to implement strategies	69.1	34.5
Political - administrating	Communicate a shared vision	65.5	27.3
Connecting	Bring new ideas to a network of people and groups*	63.6	32.7
Connecting	Mobilize people to find solutions*	63.6	34.5
Connecting	Build trust among different people and groups*	60.0	36.4
Enabling	Foster interaction among people and groups*	56.4	29.1
Connecting	*Forge agreement to implement strategies*	47.3	20.0
Political - administrating	Generate and allocate the necessary resources	47.3	41.8
Enabling	*Create a sense of urgency (by setting deadlines)*	45.5	27.3
-	None, this is not my role	7.3	10.9
-	Acted on the ground (for example diverting traffic, re-routing flood water)	41.8	38.2

n = 55

Of the respondents who chose financial resources (n=48), half or more than half identified the need for: financial incentives for communities/organizations to adapt (tax breaks, funding, etc.) (77%); financial incentives for citizens to adapt (tax breaks, funding, etc. for lot-level retrofits) (65%); clearer guidelines and/or examples for adaptation (58%); and more staff, human resources or time to work on the issues (50%).

Of the respondents who chose knowledge and legal resources (n=46), 54% identified the need for a greater understanding of practical adaptation measures (natural infrastructure, managing water, etc.), and 50% for a greater understanding of data and reports on climate change and extreme weather among citizens. We noted that only a minority of respondents identified the need for greater understanding of First Nations / Indigenous land title (13%) or the Duty to Consult with Indigenous governments (9%).

Finally, for the respondents who chose community resources (n=46), 61% identified a need for better collaboration at the regional level (61%) and better collaboration with nearby communities (52%).

7.3 Communication Processes

Communication processes, the second survey theme, was the focus of two main survey questions (both n=43). The first investigated participants' experience of internet and cellular phone service in the region; on a 10-point scale, respondents reported fair to excellent service for both. Respondents provided optional comments more often about cell phone coverage. One noted, for instance, that low-lying areas such as the locations of sewage lagoons (which may be impacted during extreme events) had poor cellular coverage.

Second, we asked respondents about their use of communication tools with citizens, and with partners and collaborators, for climate change adaptation and extreme weather events. Choices included 20 commonly-used tools. We also provided space for written comments.

For communicating with citizens about climate change and extreme weather events, the most commonly reported tools used were: in-person and social media (each 56%), followed by informal conversation with neighbours (42%) and workplace website (37%). The least-used tools for communicating with citizens were video calls, newspapers, business-type newsletters, and formal presentations.

For communication with partners and collaborators about the same issues, the most commonly used tools were: in-person and email (each 46.5%), social media (44%), and voice calls, and workplace website (each 39.5%). The least-used tools were radio, newspapers, posters in the community, personal-type newsletters, and formal presentations.

7.4 Relationships

The third and final theme was relationships, with two main survey questions. The first asked respondents (n=47) about the groups or collaborators they engage with on both general issues and those specific to climate change and extreme weather events. Second, we asked respondents (n=49) which of the same groups or collaborators are currently involved and/or should be involved with climate change adaptation. To ensure clarity, we listed many examples of the types of groups in each category. Table 2 illustrates the results of the two questions.

For our analysis, we were particularly interested in the groups and collaborators that respondents believe are least active in climate change adaptation work but should be involved, as these are potential opportunities for engagement. For our analysis, which is descriptive rather than hypothesis-driven, we chose a threshold of a 20-percentage-point difference between least involved and should be involved. Using this threshold, we identified five categories of groups which represent opportunities for engagement, identified in Table 2 with an asterisk (*). These are: social and public services organizations (libraries, food banks, anti-poverty, recreation); community, volunteer and grassroots groups and clubs; Indigenous governments; business and industry groups; and agriculture groups.

Table 2. *Involvement of Groups or Collaborators in Climate Change and Extreme Weather Events*

Type of group or collaborator	Q: Are any of these stakeholder groups involved in adapting to extreme weather events and climate change? Choose all that apply. n = 49		Q: Do you network or collaborate with these groups now? Choose as many as apply. n = 47	
	% of responses		% of responses	
	Already involved	Should be involved	Non-climate related issues	For climate change adaptation
Government				
Provincial government	61.2	10.2	68.1	36.2
Federal government	53.1	12.2	46.8	23.4
Indigenous governments	14.3*	38.8	25.5	10.6
Activist and community groups				
Environment and nature groups	42.9	34.7	68.1	34.0
Community, volunteer and grassroots	8.2*	61.2	29.8	6.4
Lobbying groups	38.8	24.5	21.3	12.8
Service organizations				
Education institutions	30.6	49.0	44.7	19.1
Health and safety	30.6	34.7	48.9	29.8
Social and public services	6.1*	46.9	36.2	6.4
Business, industry, utilities				
Business and industry	14.3*	59.2	36.2	10.6
Agriculture groups	16.3*	57.1	14.9	10.6
Utilities, power, telecoms	36.7	34.7	44.7	19.1

8.0 Discussion

A defining feature of the climate crisis is uncertainty. As climate patterns change, existing communication and leadership actors and networks will be challenged to effectively address new environmental and ecosystem realities. Regions involved in proactive planning for adaptation and in preparing for the unknown will be the ones positioned to effectively address the changes when emergencies and crisis arises.

In this context of uncertainty, our study has helped to identify the existing climate adaptation capacity within the region, which provides local actors the ability to consider how to strengthen assets. First, our study identified that the elected community leaders and senior administrators in the region are aware of climate change, are concerned about potential impacts, and can identify the resources they need to better address the climate challenges ahead. They also understand that extreme climate events have significant socioeconomic impacts and costs. Most of them have a general knowledge of their community's climate change adaptation activities even though their work is largely unrelated to climate change adaptation. This high level of awareness and concern is an asset that can be strengthened with more knowledge and can be mobilized into action when the time requires. As expected, results from this work have identified various other community organizations that must be engaged in essential climate change work.

Another existing strength is the current high level of engagement among stakeholders in this region. The fact that most of the community leaders surveyed have lived in the area for more than 20 years or their entire lives may explain this high level of interconnectedness. In addition, the strong cultural ties among the region's residents are a related advantage. Together these realities indicate a strong level of social cohesion that supports resiliency to a changing climate and better capacity to mobilize when required. At the same time, it is important to note that the residents in this area identify more strongly with their local community or their county than the region, a geographical area created for administrative purposes and that regional-scale collaboration may remain a challenge.

The community leaders have a good sense of their own potential contributions, as well as considerable skills and expertise that they can bring to the climate change adaptation effort. About a third believe that their organizations should do more for climate change adaptation. More than half the community leaders in this rural region have specific leadership skills vital for mobilization work: bringing new ideas to a network of people and groups, mobilizing people to find solutions, building trust, and fostering interaction between different people and groups.

These skills could be coordinated on a regional basis.

More than half the community leaders were able to identify key resources they will need for more effective climate change adaptation work. Some key resources identified are largely under the control of the regional organization (CSRNO) or their own community organizations and include: better collaboration at the regional level and among communities, clearer guidelines for and a better understanding of climate change adaptation measures, and greater understanding within the citizenry regarding climate change adaptation measures.

More than half the community leaders asked for clearer guidelines and examples of adaptation for climate change and better collaboration among communities and at the regional level. New social movement theory suggests that CSRNO is ideally

suited to perform these functions because of its central role within the regional leadership network. One possible action for CSRNO in this context is to create guidelines that foster awareness among the community leaders of the importance of mobilizing for climate change adaptation by strengthening the networks among community stakeholders. Distribution and dissemination of appropriate information along with the coordination of local and regional training and planning efforts are critical undertakings to be implemented. The leaders identified that they favour more personal communication tools and processes for communicating with both citizens and partners and collaborators.

The community leaders identified the groups and collaborators they believe are already involved in climate change adaptation work: primarily the federal and provincial governments, and to a lesser but still important degree, environment and nature groups, lobbying groups, education institutions, health and safety organizations, and utility organizations. Many community leaders are already working with these groups, although not often on climate change adaptation work. There are clearly opportunities for doing more networking with the groups they identified as needing to be more involved in climate change adaptation, including: Indigenous governments; community, volunteer and grassroots groups; education institutes, social and public services organizations; business and industry groups; and agriculture groups. Many of these groups are already working within their sectors on improving resilience and capacity within their communities. There are opportunities to familiarize these organizations with the relationships between their ongoing work and climate change adaptation in order to promote organic partnerships towards common goals.

Interestingly, almost all community leaders did not choose as priorities the two knowledge areas of Indigenous land title and Duty to Consult with Indigenous communities as potential resources to bring to climate change adaptation efforts. This could mean that the community leaders already know everything they need to know about these issues. However, it could also mean that they do not see engagement with Indigenous communities as highly relevant to climate change adaptation efforts, and we believe this is the more likely interpretation. Given the good relationship that exists between the government of Madawaska Maliseet First Nation and the City of Edmundston (Bernard & Bernard, 2019), this would seem to be an obvious place to start to expand the relationship to work on climate change adaptation issues. The possibility of accessing both federally-supported Indigenous and provincial funding could be leveraged to work together on common climate change adaptation initiatives, as a pilot showcase project.

Based on what we have learned from this study, an appropriate next step would be to use a similar survey for leaders of non-profit and business organizations in the region. Strong leadership and networks require ongoing development, maintenance, and coordination so they can be sustained and used when required. A regional organization that monitors and collects appropriate, essential information will provide a means for small rural communities to collaborate and benefit from economies of scale. Coordination can effectively pool shared resources to address shared needs within a spirit of cooperation. By building upon strong historical and political relationships and kinship well-established in this region, a regional organization can protect and support communities and citizens across the entire region.

9.0 Conclusion

Situating this study within the wider literature on climate change adaptation in rural regions, our work provides further analysis of adaptive capacity in rural settings. Specifically, we identified how a regional governance organization and interconnected regional leadership structure can be mobilized to better respond and adapt to extreme weather events and climate change. Building on Keskitalo et al. (2011), we found not only that barriers to addressing climate change proactively are linked to limitations within institutional structures but also that leaders operating within those structures can have the capacity to identify what they need to move beyond the barriers to make the changes required. Our work also begins to address concerns raised by Reed et al. (2014) by shining light on the internal dynamics of institutions and networks that have an impact on local adaptive capacity.

The CSRNO organization, a governance structure for the communities in its rural regional area, employs the only full-time, highly qualified climate change adaptation officer in the rural northwest region of New Brunswick. The organization, therefore, is a key resource in climate change adaptation and environmental action in this part of the province. Considering the historic floods in the main watershed in the study region for the past two years (2018 and 2019), adapting to climate change must be considered a priority for the region. However, the challenges are considerable. As a regional service commission (RSC), CSRNO experiences the same difficulties as other RSCs across the province, including limited funding for its work. Its climate change adaptation activities are supported by annual provincial project grant funding. In this context, we will make some concluding observations about leadership for climate change adaptation in rural regions.

At the time of writing, students were demonstrating in New Brunswick and across Canada demanding climate action, inspired by the words of a young activist from Sweden, Greta Thunberg, to act now. The Canadian government's 2019 wake-up call (Bush & Lemmen, 2019) recommended that communities across the country develop climate change adaptation plans. As climate emergencies are occurring more and more frequently, appropriate, coordinated, innovative strategies are required to properly support local and regional efforts in rural areas across Canada.

More than half of the community leaders surveyed identified the need for actions on climate change that were outside of their control. We believe the same needs exist for all rural communities across Canada: funding and financial incentives for citizens and organizations, and more support, regulatory pressure, or a legal mandate from higher levels of government. Given the current political and economic climate in New Brunswick and Canada in general, these needs are unlikely to be met soon.

Examples of local and regional innovation characterize the region. Energy Edmundston produces its own power to serve its local and regional electrical needs. Strategic planning and partnerships with Madawaska First Nation are resulting in thriving commercial enterprises bringing new employment and opportunities to the region. Other communities in the region are working on environmental efforts to protect and sustain wetlands, waterways, and recreation opportunities. Improved telecommunication opportunities with the Canarie fibre infrastructure reaching the Edmundston campus of Université de Moncton increase local capacity for communication networks. Health and education services are eligible to benefit from these types of infrastructures. Water and wastewater management systems, along with innovative waste disposal systems, are under development in the region. With

these developments comes the opportunity for this region to lead New Brunswick and the rest of Canada in effectively addressing and accommodating climate adaptation.

This situation of ongoing unmet needs for rural communities highlights the reality that rural communities will have to figure out for themselves how to adapt to a changing climate with limited funds. Our study opens the possibility that the way forward is in strengthening the relationships that already exist in rural communities - with the networks of groups and organizations that include the local Indigenous communities together with hunting and fishing clubs, ATV associations, women's and senior groups, community and voluntary organizations and many others. Rural communities are known for their interconnectedness and social cohesion and in the context of climate change that may well turn out to be their greatest strength.

Acknowledgements

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