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The influence of regional strategic policy on municipal climate adaptation planning

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This study examines extent and quality of climate adaptation integration within strategic plans of local governments in British Columbia, Canada. Strategic plans (n=39) were assessed using plan content analysis in order to understand whether regional planning leads to adaptation action by municipalities. Framed through an institutional resilience lens, we find regional policy guidance is critical for initiating uptake of municipal climate adaptation; however, lack of granular adaptation policies informed by appropriate climate data constrains implementation in practice. Through collaboration and leveraging strengths of different levels of government, adaptation barriers can be addressed and the quality of adaptation policies improved.

Key words: Urban planning, climate change resilience, institutions, plan content analysis, Vancouver Island, British Columbia

INTRODUCTION

Coastal communities around the globe are becoming increasingly susceptible to stressors associated with climate change (IPCC, 2018; Fitton et al., 2021). In Alaska, climate induced coastal erosion has severely impacted community habitability, with over 10 communities considering relocation (Bronen and Chapin, 2013); in Australia, intense flooding frequently wipes out critical infrastructure, isolating coastal communities and leading to resident evacuation (Power and Callaghan, 2016); and in the South Pacific, entire countries are being

submerged as a result of sea level rise (Thomas and Benjamin, 2018). Indeed, the Intergovernmental Panel on Climate Change (IPCC) has stressed the severity and frequency of contemporary climate impacts for coastal locations, and warned that vulnerability is very likely to increase (IPCC, 2018).

Responding to climate change is a complex task, with strategies grouped into two distinct yet complementary approaches: mitigation and adaptation. The IPCC defines mitigation as a "human intervention to reduce the sources or enhance the sinks of greenhouse gases" (IPCC, 2018, p. 554), while adaptation is intended to minimize or avoid harm by adjusting human and natural systems to cope with climate impacts (IPCC, 2018). Mitigation is a preferred global approach to climate change (Di Gregoria et al., 2019). International institutions such as the Kyoto Protocol and the more recent Paris Agreement, have focused on mitigation largely because benefits are more certain; reductions in atmospheric greenhouse gases (GHG) address the root cause of climate change (Oberthür and Groen, 2020). However, mitigation is associated with several complex challenges, and despite aggressive attempts to reduce GHG emissions, global concentrations continue to increase (IPCC, 2018). Thus, climate scholars warn that a reliance on mitigative strategies alone is insufficient, since continued climate change is locked-in (IPCC, 2018). Adaptation is therefore a necessity and must be pursued in order to address the unavoidable consequences of climate change.

Local governments are often responsible for taking the lead on climate action, given their proximity to the population, and responsibility for land use decisions/ development regulations that can influence exposure to climate hazards (Nalau et al., 2015). Many local governments, primarily in more developed countries, have initiated a response to climate change by developing climate action plans, incorporating emissions reduction targets into strategic planning, and in some instances, planning for adaptation (Baynham and Stevens, 2014; Chu, 2018; Jones, 2019). However, in Canada and elsewhere, local strategic planning and policy remains focused on mitigation, with adaptation receiving significantly less attention (e.g. Baynham and Stevens, 2014; Guyadeen et al., 2019).

This trend is apparent in the Canadian province of British Columbia (BC) (e.g. Baynham and Stevens, 2014). BC has emerged as a climate action leader in North America, with a well considered climate action agenda. Notably, Bill 27, The Local Government Statutes Amendment Act, passed in 2008, requires all local governments with an Official Community Plan (OCP) and Regional Growth Strategy (RGS) to incorporate actions to reduce GHG emissions within these planning documents (Province of BC, 2008). While this mandate has facilitated the widespread incorporation of climate change considerations within local strategic documents, mitigation continues to be prioritized over adaptation. To be sure, no similar mandate for climate adaptation exists.

Scholarship suggests that higher levels of government can spur greater action on adaptation at the local level (Vogel et al., 2020). For example, studies exploring drivers for local climate action across the United Kingdom (Porter et al., 2015), Norway (Amundsen et al., 2010), and United States (Dilling et al., 2017) find that a strong mandate from higher levels of government, along with funding, and policy direction are critical supports for local adaptation efforts.

While less studied, regional governments can be important motivators for local action on adaptation, particularly in instances where there is no policy mandate from higher levels of government. Because municipalities operate under regional political and administrative structures, regional governments can guide municipal planning priorities (Vogel et al., 2020). Regional guidance can better harmonize climate efforts across municipalities and rural jurisdictions, result in policy coordination and information-sharing on climate adaptation (Vogel et al., 2020), and enhance local adaptive capacity by merging sufficient political and financial resources to undertake and implement a climate adaptation agenda (Hughes et al., 2018).

While the impact of higher-level government mandates on municipal climate action is an emerging topic of interest, less research has examined whether regional planning does in fact influence municipal engagement in climate adaptation planning (Hughes et al., 2018; Vogel et al., 2020). Moreover, although a wealth of literature explores planning and policy dimensions of climate change (e.g. Baynham and Stevens, 2014; Lyles et al., 2014;

Bonnett & Birchall, 2020), less attention is paid to analyzing how local governments are specifically incorporating adaptation into strategic planning documents.

To contribute to the discourse in this area, and through an institutional resilience lens, we examine the relationship between regional and municipal institutions, and the extent and quality of climate adaptation integration within the RGSs and municipal OCPs of local governments on Vancouver Island, BC. Considering adaptation inclusion at both the regional district and municipal scale allows us to explore whether there is evidence that regional planning leads to climate adaptation action by municipalities. This sheds light on whether regional planning may be an effective tool to prompt municipalities to work towards a climate adaptation agenda, in the absence of a provincial mandate to adapt to climate change (Hughes et al., 2018).

Resilience

Resilience has emerged as a flexible and diverse framework to unpack complexities associated with vulnerability to climate stressors, and the ability of local governments to adapt to those stressors (Birchall and Bonnett, 2021; Kythreotis and Bristow, 2017). In policy discourse, scholars note that the term "resilience" is replacing "sustainability" as a strategic planning and policy priority (Kythreotis et al., 2020; Smith et al., 2018). However, because of its interdisciplinary nature and varying definitions, some scholars warn that resilience has become diluted, an increasingly 'fuzzy' and vague concept (Smith et al., 2018). Moreover, resilience in planning and policy statements has been described as high-level and theoretical, with little understanding of how to meaningfully translate resilience concepts into on the ground reductions in vulnerability (Smith et al., 2018; Tyler and Moench, 2012).

In recognition of these drawbacks, scholars have developed frameworks that integrate theoretical and empirical knowledge on factors contributing to urban resilience in practice (e.g. Tyler and Moench, 2012). Institutional resilience, in particular, has gained traction as a lens for evaluating community response to climate stressors – how policy and planning can facilitate anticipatory action and adaptation, for instance (Kythreotis and Bristow, 2017; Smith et al., 2018). Institutions, in this context, refer to formal or informal social

conventions that structure behavior and interactions (Tyler and Moench, 2012), including strategic planning documents, development regulations, zoning, and other planning/ policy tools.

These local planning tools are important for operationalizing and delivering a climate adaptation agenda (Smith et al., 2018), and specifically for translating adaptation goals into on the ground actions that can facilitate reductions in vulnerability (i.e. by restricting development and unsuitable land uses in hazardous locations). Local institutions can also promote decision-making and planning priorities that move away from the traditional approach of "predict and plan", to those that better cope with uncertainly and anticipate change (Smith et al., 2018).

In this paper, we use institutional resilience as a lens to explore the relationship between municipal and regional institutions, and the quality of those institutions in the context of climate adaptation planning.

CONTEXT

Vancouver Island, British Columbia

Vancouver Island is located off the western coast of Canada. The Island is sparsely populated, with a population of approximately 800,000 people (Statistics Canada, 2017). Topographically, the Island has a rugged coastline, several fjord-like inlets, coastal lowlands, and central mountain ranges. Climate change effects already underway include rising sea levels, and increases in average temperature and rates of precipitation. Average annual temperature and precipitation is expected to rise from 1.3 to 2.7 °C and 2 to 12%, respectively, by 2050 (BCME, 2015). Communities on the Island exhibit a heightened vulnerability given a prominence of development along the coast and other low-lying areas.

Regional planning in British Columbia

Canada has three main levels of government, and they are organized hierarchically: federal, provincial/territorial, and local. Local refers to municipalities and regional entities (e.g. regional districts (RD)). In BC, the Local Government Act is the primary provincial legislation that outlines the responsibilities/ authorities

of local governments (Province of BC, 2008). Municipalities exist under the political and operational umbrella of regional governments. Both regional and municipal governments are required to provide essential services (economic development, water, sewage disposal, and solid waste management), and both can recover the costs of services through various measures, including development fees, taxes, and charges (Cashaback, 2001).

RDs are unique in Canada and were developed to operationalize a strategy of "gentle imposition" (Cashaback, 2001). RDs are viewed as an extension of local government and "borrow" power from municipalities as opposed to "having" power over municipalities (Cashaback, 2001). Rather than dictating policy direction, their influence on municipal decision-making is geared towards collaboration and joint decision-making.

For instance, regional and municipal decision-makers cooperate to assess shared service delivery and determine which services would be more efficiently delivered at the regional vs. municipal scale (Cashaback, 2001). Moreover, municipalities are required, by provincial legislation, to show how strategic planning goals within their OCP align with the overarching goals and vision of their RD. This coordination and consistency between regional and municipal strategic planning processes is intended to be flexible and reflexive, in an effort to facilitate collaborative approaches to service planning and delivery (Cashaback, 2001). Literature highlights the importance of flexible institutions and planning processes in promoting resilience building, which can result in comprehensive climate adaptation, particularly when coupled with collaborative decision-making at all levels of government (Birchall and Bonnett, 2021; Fraser and Kirbyshire, 2017).

APPROACH

This study involved a plan content analysis (PCA) of the RGSs and municipal OCPs of local governments on Vancouver Island. Vancouver Island is comprised of seven RDs, however, only three (Comox Valley Regional District, Capital Regional District, and Nanaimo Regional District) have passed a RGS (n=3). All 36 municipalities on Vancouver Island have developed an OCP (n=36). These 39 plans are analyzed to investigate the extent and quality of adaptation integration in local strategic planning. This approach allows for critical

insights to be drawn regarding the influence of regionally set planning goals on municipal climate action, and whether the presence of a RGS affects the extent and quality of adaptation integration into municipal OCPs.

Plan content analysis

Since the 1990s, PCA has rapidly increased in use as a method in climate research (Lyles and Stevens, 2014). Defined as "a systematic process of measuring the characteristics of a plan using content analysis techniques" (Lyles and Stevens, 2014, p. 434), the reliability of a PCA rests on transparency and logic of the process (Baynham and Stevens, 2014; Lyles and Stevens, 2014).

Building off Baynham and Stevens (2014), and influenced by Tang et al. (2011) and Guyadeen et al. (2019), the PCA for this study was organized around categories and indicators. Categories are broader concepts that guide the scoring process, while indicators are more granular features that are assigned to each category and used to score the plans according to how well they reflect a particular element of interest (Baynham and Stevens, 2014); the categories of a PCA organize the scoring process, and indicators are used to assign specific scores within each category.

Categories

In their work, Baynham and Stevens (2014) developed four categories to evaluate the integration of both mitigation and adaptation in OCPs in BC. We use the same four broad categories to evaluate the content of the regional and municipal plans: goals, policies, fact base, and implementation. These categories allow us to explore specific sections of strategic planning documents that are important for guiding and implementing a climate adaptation agenda:

- Goals: Assesses whether plans include climate change and adaptation within the guiding vision and goals of the strategic documents.
- Policies: Identifies the presence or absence of specific adaptation and climate related policies within various sectors and planning areas (e.g. transportation, building, land use, environment, etc.).

- Fact base: Examines the extent to which planning documents include background or contextual information about the causes of climate change, climate specific vulnerabilities, and the local relevance of climate stressors.
- Implementation: Evaluates the strength of the implementation plan (e.g. timeline for implementation, funding identified, responsible parties for implementation determined).

Indicators

Following a protocol used by Tang et al. (2011) to evaluate local climate change action plans, several indicators were assigned to each category (Table 1). The indicators are specific to the overall intent of the respective category. For example, within the goals category, there are four assigned indicators: concept of climate change, climate change adaptation integrated, climate change adaptation as its own goal, and long-term goals. These indicators are used to assess whether plans consider climate change as a priority within their overarching goals and visions, whether adaptation is integrated and distinguished from mitigation, and whether plans are accounting for climate change within long term goals. A total of 17 indicators were used to score the plans, with scores ranging from 0-2. A score of 0 is received if the plan does not mention an aspect of interest, a score of 1 if an element is considered but not to a great extent, and a score of 2 is given if the plan thoroughly considers the element in question.

Once the protocol was finalized, it was tested on several documents by both researchers to ensure alignment in the scoring process and to identify any shortcomings. During the scoring process, weekly meetings were held to review the scores and check the consistency of the systematic approach in application. To account for variation in the number of municipalities within each of the seven RDs, the range of total scores for municipal OCPs are examined. By exploring the lower and upper limits within the range of municipal OCP scores for each RD, the influence of RGSs on municipal climate adaptation planning can be better observed. Because not all RDs have developed a RGS, we can compare the scores of municipal OCPs across RDs, which can shed light on whether there is evidence that regional planning leads to action by municipalities in terms of adaptation.

Goals	Policies	Fact Base	Implementation
Concept of climate change	Climate change adaptation policies and risk reduction	Reliable climate data	Implementation plan with individual actions
Climate change adaptation integrated	Land use and development policies related to climate impacts	Scaled climate data	Implementation timeline
Climate adaptation as part of its own goal	Transportation policies related to climate impacts	Long term projections	Funding identified
Long term goals	Energy policies related to climate impacts	Risk assessment or vulnerability analysis	Responsible parties identified
	Language used and strength of policies (e.g. should vs must)		

Table 1. Plan content analysis categories and indicators.

Broad categories of goals, policies, fact base, and implementation are used to guide the scoring of strategic planning documents with a number of indicators within each category used to determine plan scores.

RESULTS

PCA results are presented for both regional and municipal plans in order to better understand the state of local climate adaptation planning on Vancouver Island. Findings are organized according to results within each category of the PCA. A concluding section on the relationship between regional and municipal planning documents explores whether regionally set goals trigger greater climate action on the part of municipalities.

Scores of the three regional strategies varied from 21 to 24, out of a total possible score of 34 (Table 2). While regional scores show little variation, the documents tended to score the lowest in the fact base and goals category, and highest in the policies and implementation category. This trend is evident for municipal OCPs as well, however, scores ranged from 7 to 32, showing greater variation (Table 3). For reference, a score of 0-12 is characterized as low, 13-23 as mid-range, and 24-34 as high.

	Comox Valley RD RGS	Capital RD RGS	RD of Nanaimo RGS
1. Goals (total out of 8)	5	4	6
Concept of Climate Change	2	2	2
Climate Change Adaptation Integrated	1	0	2
Climate Change Adaptation as Part of its Own Goal	0	0	0
Long Term Goals	2	2	2
2. Policies (total out of 10)	8	9	8
Climate change adaptation policies and risk reduction	1	1	1
Land use and development policies related to climate impacts	2	2	2
Transportation policies related to climate impacts	2	2	2
Energy policies related to climate impacts	2	2	2
Language used and strength of policies (should vs must)	1	2	1
3. Fact Base (total out of 8)	4	4	2
Reliable climate data	2	1	0
Scaled climate data	0	2	0
Long term projections	1	1	1
Risk assessment or vulnerability analysis	1	0	1
4. Implementation (total out of 8)	4	6	8
Implementation plan with individual actions	1	2	2
Implementation timeline	2	2	2
Funding identified	0	0	2
Responsible parties identified	1	2	2
TOTAL	21	23	24

Table 2. Plan content analysis results for regional growth strategies.

Scores for each indicator are presented with category scores and a grand total calculated for each regional planning document. Scores show that on average, regional plans score the highest in the policy category and the lowest in the fact base category.

	Goals	Policies	Fact Base	Implementation	TOTAL
Capital RD					
Central Saanich	6	8	4	2	20
Colwood	5	8	3	5	21
Esquimalt	2	4	2	5	13
Highlands	3	8	2	5	18
Langford	5	8	6	5	24
Metchosin	2	7	2	7	18
North Saanich	2	5	2	3	12
Oak Bay	7	10	7	8	32
Saanich	5	8	3	5	21
Sidney	2	6	2	4	14
Sooke	4	8	4	5	21
Victoria	5	10	7	5	27
View Royal	5	9	3	7	24
Cowichan Valley RD					
Duncan	3	8	4	5	20
Ladysmith	2	5	2	7	16
Lake Cowichan	3	8	2	4	17
North Cowichan	6	10	7	6	29
RD of Nanaimo					
Nanaimo	3	8	2	7	20
Lantsville	2	6	0	4	12
Parksville	8	9	8	6	31
Qualicum Beach	3	8	3	5	19
Alberni-Clayoquot RD					
Port Alberni	1	5	0	6	12
Tofino	3	8	4	5	20
Ucluelet	5	8	2	5	20
Comox Valley RD					
Comox	5	8	6	5	24
Courtenay	4	9	4	6	23
Cumberland	7	10	5	6	28
Strathcona RD					
Campbell River	7	9	4	4	24
Gold River	2	7	2	4	15
Sayward	1	3	1	4	9
Tahsis	5	8	4	5	22
Zeballos	1	4	0	2	7
Mount Waddington RD					
Alert Bay	3	7	2	4	16
Port Alice	3	9	2	4	18
Port Hardy	7	10	7	4	28
Port McNeil	1	3	0	3	7

Table 3. Plan content analysis results for municipal official community plans.

Scores for each category are presented with a grand total calculated for each municipal planning document.

Goals

RGSs and municipal OCPs tend to lack a specific focus on adaptation within the broad goals and visions of these guiding documents. Instead, mitigation remains the focus of climate related goals, with adaptation only mentioned or addressed in a vague and non-committal manner. RGSs and OCPs score high for indicators looking into whether climate change is included as an overarching goal, and whether or not long-term goals are set. For municipal documents, a majority of the overarching goals are grounded in concepts of sustainability with many of the OCPs considering climate change. For instance, the City of Nanaimo OCP identifies "Sustainability" as a "Guiding Principle" that informs the goals and policies, including climate actions, of the plan (City of Nanaimo, 2008, p. 13). However, in many instances climate change considerations are highly fragmented and only present within recently amended sections. In this case, climate change is addressed separately and is not incorporated throughout the rest of the OCP. Moreover, climate change appears to be an afterthought that is addressed solely to comply with the provincial mandate. For example, and as with several other municipalities, the Gold River OCP does not include climate considerations in it's overarching vision or strategic goals. Instead, there is a recently added section near the end of the document titled "Energy and Climate Change" (Village of Gold River, 2018, p. 37). This section deals exclusively with mitigation (adaptation is not mentioned directly, or indirectly) and the mandated provincial emissions reduction targets were outlined as the major driver for incorporating this content on climate change (Village of Gold River, 2018).

Of note are the low scores received for indicators examining the quality of adaptation integration within climate goals, and the presence of adaptation as its own goal. For example, only five of the 36 OCP's received a score above 0 for the indicator assessing whether adaptation was present within the plan goals as part of its own goal. These findings align with the results of the Baynham and Stevens (2014) study where the authors highlight that the lowest scoring indicator within their goals category of the PCA was the inclusion of specific goals related to adaptation.

Policies

RGSs score the highest in the policies section of the PCA, and OCPs generally perform well in this area as well. The high scores within this category are largely seen because of the inclusion of mitigative policies across various sectors, despite a lack of adaptation specific policies. These include policies and actions intended to reduce emissions and enhance energy efficiency within, for example, transportation, agriculture, and land use sectors. Plans scored the lowest in the climate change adaptation and risk reduction indicator. Indeed, while many local plans establish numerous policies that directly relate to climate change, few of the policies directly consider adaptation. For instance, the District of Saanich OCP includes a section on climate change that details six climate action policies (District of Saanich, 2008). Of these climate policies, only one considers adaptation; "Prepare and implement Saanich's 'Climate Change Adaptation Plan'" while all others focus on reducing GHG emissions and enhancing energy efficiency (District of Saanich, 2008). Moreover, while an array of climate impacts are considered, specific policies aimed at preparing for climate vulnerability are not included. For example, detailed measures such as retreat and development regulations to minimize flood threats are largely absent. Rather, adaptation is indirectly referenced through the encouragement of land use planning that ensures safe development and addresses natural hazards. Mitigation appears to be a higher priority than adaptation, despite climate impacts increasing in frequency and severity across Vancouver Island.

Fact base

Fact base is the lowest scoring category for both RGSs and municipal OCPs. This is largely because the climate information provided focuses on emissions, does not consider climate impacts, does not scale climate impacts, and fails to use risk assessments to inform/justify specific policies and actions. The lowest scoring indicator within this category is the inclusion of risk assessments and vulnerability analysis as informing data for the development of climate related policies and actions. Moreover, climate data that is present within planning documents tends to focus on emissions projections and targets, with little consideration for contemporary and predicted climate impacts. For example, similar to the other two growth strategies, the Comox Valley RD RGS

received a score of 4 out of 8. Within this category, the strategy scored the highest within the reliable climate data indicator with a score of 2. This is because the document has clearly referenced the IPCC's predictions on climate impacts (Comox Valley Regional District, 2010). However, this data pertains to global impacts, and as a result, is not properly scaled to the region. Long-term projections are integrated within the climate change policy area, but only relate to long-term emissions rather than projections for climate impacts and subsequent risk assessments. Results within this category suggest that RDs and municipalities on Vancouver Island are challenged by a lack of climate data that is appropriately scaled and specific to their area of interest, or by their ability to adequately make use of and utilize climate data to inform strategic policies.

Implementation

Strategic documents tended to score relatively high in this category. Most of the planning documents have identified an implementation timeline with individual action items; however, plans score lower for the indicators associated with whether funding and responsible parties are identified. For example, several municipal OCPs showcase an implementation plan that explicitly identifies implementation actions, and a timeline for policy areas. However, plans fail to consider sources of funding and actors involved in the implementation of specific policies.

In contrast, the District of Saanich OCP places a heavy emphasis on implementation throughout the entirety of the plan, and identifies implementation tools and financial resources for translating policies into practice (e.g. Development Permit Areas and the Development Cost Charge Bylaw) (District of Saanich, 2008, p. 77). Located in the Capital RD, Saanich is the most populous municipality within the RD and has access to a stable and large tax base (District of Saanich, 2008). Since the passing of the OCP, Saanich has implemented several of its strategic policies, including the development and adoption of the Saanich Climate Change Adaptation Strategy. These results suggest that climate adaptation policies identified in local planning documents are more likely to be implemented in practice if strategic documents identify specific funding sources and responsible parties.

Relationship between regional and municipal planning

In general, it was found that municipal planning documents scored lower if the municipality was located in a RD lacking a RGS. For instance, the lowest scoring plans (7/34) were found in Strathcona RD and Mount Waddington RD. The RDs that are lacking a growth strategy tend to be more rural, with fewer large urban centers; there are only three municipalities within the Alberni-Clayoquot RD, with the largest municipality (Port Alberni) having a population of 20,712 in 2016 (Statistics Canada, 2017). In particular, the RDs lacking a RGS tend to be characterized by static, or very minimal, population growth, which ultimately negates the need for a growth strategy. As an extreme example, the Alberni-Clayoquot RD experienced a -0.3% change in population between 2011-2016 (Statistics Canada, 2017). This out-migration of residents can create significant financial challenges given the unstable tax base, and can lead to the RD prioritizing economic growth and development, which often conflicts with a climate action agenda (Hamin et al., 2014; Torabi et al., 2018).

Scores of municipal OCPs within the three RDs with a growth strategy range from 12 to 32, with several very high scoring OCPs. In contrast, municipalities within regions that have not adopted a RGS, received scores ranging from 7 to 29. Contrary to expectations, the highest scoring OCPs are not those of bigger cities and towns. It was expected that larger cities would have the highest scoring plans given the greater access to necessary resources such as funds and expert personnel. Rather, smaller towns such as Oak Bay and Parksville demonstrated exemplary plans which integrate climate change adaptation and aim for resiliency. Notably, these smaller municipalities are located within RDs that have a RGS (Capital RD and RD of Nanaimo). The higher scores are thus very likely influenced by the presence of regional climate goals or may be explained by the need for adaptation due to prominent climate impacts including sea level rise and extreme weather.

In terms of the influence of regional planning on municipal climate action, it is first important to note that a majority of OCPs include a regional context statement describing how the OCP aligns with regionally set goals. This is a planning requirement prescribed by provincial legislation to ensure that future growth, development, and strategic planning goals are consistent and coordinated between RDs and their incorporated municipalities

(Regional District of Nanaimo, 2011). Thus, when a RD prioritizes climate adaptation and mitigation by developing a climate goal to guide their RGS, this helps to ensure that the incorporated municipalities undertake efforts to align with that goal through the regional context statement. For example, the RDN growth strategy is guided by principles of sustainability with a number of complementary strategic goals, including to "Prepare for Climate Change and Reduce Energy Consumption" (Regional District of Nanaimo, 20011, p. 16). Located within the RDN, the City of Nanaimo OCP then demonstrates consistency with the RGS by outlining that:

> "The City's Official Community Plan is based upon a guiding principle of sustainability. This guiding principle is supported through goals and objectives that address climate change and energy consumption, urban growth and land use, and transportation modes and mobility patterns." (City of Nanaimo, 2008, p.17).

To further support this alignment, the Capital RD RGS identifies 10 guiding objectives, including "Significantly reduce community-based greenhouse gas emissions" (Capital Regional District, 2018, p. 1). To show consistency with the regional goal of reducing community-based emissions, the City of Victoria OCP identifies numerous policies that adhere with climate mitigation as well as how these policies will be implemented in practice:

"One of the key implementation strategies is the recent development of the Climate Leadership Plan which provides strategic direction for climate change mitigation and adaptation." (City of Victoria, 2012, p. 29).

DISCUSSION

We use institutional resilience as a theoretical lens to interpret the results of the PCA. First, we use the findings of the PCA to document the extent of adaptation integration within strategic planning documents of RDs and municipalities on Vancouver Island. Next, we examine the relationship between regional and municipal strategic planning documents in order to explore the relational dynamics between these two levels of government in the context of climate adaptation planning. Finally, we discuss the quality of regional and municipal

institutions, with attention paid to institutional barriers that may constrain progress on an adaptation agenda. Exploring the case of Vancouver Island through an institutional resilience lens assists with understanding the factors that facilitate and challenge local climate adaptation planning, and helps to pinpoint specific areas where resilience building can be enhanced.

The status of adaptation planning on Vancouver Island

Climate adaptation planning is progressing for both RDs and municipalities on Vancouver Island. Results of the PCA show that, on average, most strategic planning documents include goals and policies centered on addressing climate change. With a provincial mandate requiring that emissions reduction targets be incorporated within OCPs and RGSs, it is no surprise that the results of our PCA show high scores for indicators evaluating the extent of mitigation policies. However, we also find that many planning documents included policies and goals addressing climate adaptation as well. Scholars demonstrate that adaptation is more likely to be incorporated into local institutions (policy and planning tools) if there is direction to do so from higher levels of government (Baynham and Stevens, 2014; Senbel, et al., 2013). In the absence of a provincial mandate on climate adaptation, the role of regional governments becomes important for spurring the integration of adaptation within municipal OCPs. To explore whether there is any evidence that regional policy guidance leads to greater action on adaptation on the part of municipalities, we examine the relationship between regional and municipal institutions.

Relationship between regional and municipal institutions

While adaptation planning is progressing on Vancouver Island, some municipalities incorporate adaptation goals and policies within their OCPs to a much greater extent than others. On average, we find that municipal OCPs performed better in the areas of climate change and adaptation integration within strategic planning if the municipality is located in a RD with a RGS that lists climate adaptation as an overarching goal. RDs have an influence on the strategic planning and development decisions made by municipalities through the requirement that municipal planning goals reflect and align with regional planning priorities (Tang et al., 2011). Thus, with regional leadership on adaptation, it is more likely that municipalities will follow suit and incorporate

adaptation within their planning tools. Indeed, RDs have the authoritative power to influence municipal planning goals, highlighting the critical role of regional governments in spurring adaptation action on the part of municipalities.

However, institutions must not only embed adaptation goals, they must also be flexible, adaptive, and promote the development of context specific solutions to climate vulnerability (Smith et al., 2018; Kythreotis, 2018; Howarth et al., 2018). Indeed, Howarth et al. (2018) stress that adaptation policy must be developed with an operational and local lens to ensure that decision-making is better coupled with end user needs, leading to granular application and greater clarity of responsibilities in practice. Our findings suggest that an intricate relationship exists between regional and municipal institutions, where greater flexibility and awareness of local contextualities at the regional level promote the development of municipal policies that are tailored to the community and more likely to be implemented in practice (Kythreotis, 2018; Vogel et al., 2018). Municipalities are required to show alignment with regional planning goals by incorporating a regional context statement in their OCP, however, they are also able to adapt this statement to best suite their community's needs and existing strategic planning priorities. These insights are echoed in resilience literature where it is suggested that regional decision-makers are sufficiently near to municipal governments to be cognizant of the contextual factors influencing climate risks and adaptation barriers (e.g. Vogel et al., 2018), yet distant enough to identify the strategic climate action priorities that would foster resilience building at a broader regional scale.

Quality of regional and municipal institutions

The quality of institutions is a key determinant of the ability of local governments to make progress on climate adaptation planning (e.g. Tyler and Moench, 2012; Tang et al., 2011). The quality of institutions is informed by best practices within the literature and depends strongly on the likelihood that adaptation policies within strategic documents will be implemented and effective in practice (e.g. Lyles and Stevens, 2014). For instance, climate literature demonstrates that adaptation goals within local plans are more likely to be implemented if committal language is used and policies are granular/specific to local vulnerabilities (e.g.

Baynham and Stevens, 2014; Birchall and Bonnett, 2021; Howarth et al., 2018). While the general quality of municipal adaptation planning is greater with regional leadership and policy guidance, the findings of the PCA point to the presence of distinct institutional barriers that may act as obstacles for anticipatory adaptation and/or reduce the effectiveness of local government adaptation planning in practice.

Institutional barriers: strategic goals and policies

Results of the PCA on both regional and municipal strategic documents revealed that, in general, adaptation consideration within goals and policies is outweighed by mitigation, addressed in a piecemeal manner, and lacking in detail. Climate literature supports this notion and warns that a fragmented approach to adaptation, and a lack of detail around how actions translate into specific outcomes such as planning and development regulations, do not provide decision-makers sufficient regulatory justification for action on the ground (Baynham and Stevens, 2014; Horney et al., 2017; Hu et al., 2018; Tang et al., 2011). For instance, while the risk of coastal flooding and erosion is increasing on Vancouver Island (BCME, 2015), our findings show that detailed measures such as the planned relocation of at-risk infrastructure and development regulations to minimize flood threats are largely absent in both RGSs and OCPs. This lack of granular adaptation policies can significantly limit the ability of decision-makers to steer development out of vulnerable and hazardous areas (Lyles et al., 2018; Birchall and Bonnett, 2021).

Institutional barriers: fact base and implementation

Strategic documents tended to score the lowest in the fact base category of the PCA, and received low assessments for the indicators associated with whether funding and responsible parties are identified in implementation plans. For instance, RGSs and OCPs, on average, lack reference to appropriately scaled climate data and site-specific risk assessments. This creates challenges for ensuring that adaptation planning is rooted in, and informed by, sound science (Ford and King, 2015). However, climate science involves a degree of uncertainty and is often challenging to scale to a local level, which may explain the lower scores received for indicators looking at the use of scaled and reliable climate data (Krellenberg and Barth, 2014; Van Stigt et al., 2015; Stults

and Larsen, 2018). In addition to a lack of detail and committal language around adaptation policies, we found that the implementation sections of OCPs and RGSs included limited identification of funding and responsible parties. Taken together, this may act to release local governments from the responsibility of undertaking the vision and policies outlined in strategic documents (Baynham and Stevens, 2014).

Opportunities to Enhance Institutional Quality

Our findings suggest that RDs and municipalities are cooperating mainly in the area of aligning their strategic planning tools and priorities. This can be beneficial for building regional resilience to climate stressors by, for example, ensuring that planning and development decisions at regional and municipal scales are working together to reduce vulnerability and climate exposure. However, RDs and municipalities face challenges and key barriers when it comes to implementing these aligned strategic policies and goals. To increase the likelihood that adaptation strategies and resilience building efforts are implemented and effective in practice, RDs and municipalities must strengthen their collaborative efforts to also include a focus on learning and innovation, resource sharing, and joint knowledge and decision-making by all parties involved (Fraser and Kirbyshire, 2017). In practice, such an approach can help address local institutional barriers and promote greater power sharing across local, regional and national levels of government, supporting recommendations for decentralisation by national governments (Fraser and Kirbyshire, 2017). On Vancouver Island, for instance, RDs and municipalities can share best practices on how to better develop clear and detailed adaptation objectives and pool their resources and knowledge to translate broad goals into granular scale outcomes such as planning and development regulations.

To enhance the acquisition and use of climate science within strategic adaptation planning, RDs and municipalities can cooperate in data sharing. This may include the collection and use of regional vulnerability and risk assessments, as well as information sharing for potential strategies to address uncertainty in climate science (Hu et al., 2018; Lyles et al., 2018). These efforts are particularly useful for municipalities and RDs that are characterized by an unstable tax base and stagnant financial resources. For example, the lower density and

isolated RDs and municipalities on Vancouver Island, often face heightened capacity constraints that may decrease the likelihood and ability of decision-makers to dedicate their limited resources to data collection. In addition, with greater communication between regional and municipal governments, decision-makers can better identify sources of funding and responsible parties for implementing strategic priorities (regional vs. municipal responsibility) (Hu et al., 2018; Lyles et al., 2018).

CONCLUSION

On Vancouver Island, vulnerability to climate stressors is accentuated and the need to employ adaptation planning is growing. Recognizing the need to respond, the provincial government passed a mandate requiring the integration of mitigation in local OCPs and RGSs; however, no similar mandate for adaptation exists. Nevertheless, adaptation planning is progressing at both the municipal and regional level, and we find that regional policy guidance is a key factor initiating the uptake of climate adaptation at the municipal level. Of the seven RDs on Vancouver Island, three have developed a RGS, and these three growth strategies all incorporate climate adaptation as a central planning goal. PCA results demonstrate that municipal OCPs performed better in the area of adaptation integration within strategic planning if the municipality is located in a RD with a RGS that lists climate adaptation as an overarching goal. Moreover, this research emphasizes that greater flexibility and awareness of local contextualities at the regional level is key for promoting the development of municipal adaptation policies that are tailored to the community and, thus, more likely to be implemented in practice.

Although adaptation planning is progressing on Vancouver Island, this research uncovers several local institutional barriers that may constrain adaptation implementation and effectiveness in practice. We find that, on average, regional and municipal institutions lack granular and detailed adaptation policies that are informed by scaled and reliable climate data and supported by rigorous implementation plans. To address institutional constraints, we highlight the need for stronger collaboration between regional and municipal governments to foster knowledge, resource, and data sharing. With continued climate change locked in, the need for collaboration on climate responses at all levels of government becomes urgent. The results of this research help to better

pinpoint the role played by regional governments within the current hierarchy of climate policy and response. Although contemporary climate responses follow a top-down approach with national and provincial governments held responsible for "mandating" and "spurring" local climate action, we find that regional governments can be key players helping to motivate and strengthen the quality of adaptation action on the part of municipalities. Driving adaptation policy development at the local level, with support (funding, tools) from higher levels of government, can strengthen the effectiveness and implementation of adaptation policies in practice. Because the need to adapt is not unique to local governments on Vancouver Island, the insights presented here, along with the recommended interventions, can assist decision-makers elsewhere with their efforts to enhance climate preparedness and resilience.

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The authors report there are no competing interests to declare.

ADDITIONAL INFORMATION

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