



Are municipal land use plans keeping pace with global climate change?



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ABSTRACT

Published research on municipal climate change plans to date has been strictly cross-sectional: it reveals the status of plans at particular points in time, but does not examine whether and how plans are evolving over time to keep pace with our understanding of climate change. We build on a 2011 study of plans in the Canadian province of British Columbia by examining updated versions of those plans as of 2015. We find that the climate change content in the plans did not change much from 2011–2015 and that there is much room for improvement. Our findings suggest that municipalities can possibly strengthen their plans by: (1) investing resources into creating and maintaining a detailed inventory of factual information regarding local climate risk and vulnerability, and (2) fostering political support among elected officials and residents for developing climate change planning goals and implementation mechanisms to help achieve the goals.

1. Introduction

There is increasing urgency for municipalities to respond to global climate change by pursuing mitigation and adaptation strategies that help to both limit the scope of climate change impacts and prepare for impacts considered to be inevitable. On the mitigation side municipal governments typically have control over local land use and development decisions that shape urban form and energy consumption (Ewing et al., 2007), which arguably provides local decision-makers with multiple potential mechanisms for reducing local greenhouse gas (GHG) emissions. Local control over land use also provides opportunities for adaptation planning. Municipalities will be on the “front lines” when it comes to the impacts of climate change, such as extreme weather events and rising sea levels (Baynham and Stevens, 2014, p. 557). Municipal governments are also the “first line of defense” in responding to climate change, as they “set the terms by which land will be used, homes designed, buildings built, and ecosystem services preserved” (Hamin, 2011, p. 122). Municipalities can respond to and prepare for climate-related hazards by using land use planning to direct growth away from hazardous areas, to assist residents in relocating at-risk dwellings to safer locations, and to manage post-disaster redevelopment in ways that reduce future vulnerability (Berke and Stevens, 2016, p. 283).

Scholars have studied municipal mitigation and adaptation planning in part by evaluating whether and to what extent municipal land use plans address climate change (e.g. Wheeler, 2008; Bassett and Shandas, 2010; Boswell et al., 2010; Tang et al., 2010; Hamin, 2011;

Preston et al., 2011; Baker et al., 2012; Millard-Ball, 2012; Stone et al., 2012; Yalcin and Lefevre, 2012; Baynham and Stevens, 2014; Reckien et al., 2014; Bryan, 2015; Li and Song, 2015; Schrock et al., 2015; Damsø et al., 2016; Lysák and Bugge-Henriksen, 2016; Woodruff and Stults, 2016). These studies are generally founded on a belief that higher-quality plans will lead to better mitigation and adaptation planning outcomes. Though high-quality plans are neither necessary nor sufficient for stimulating action on climate change, they do indicate that municipalities are paying attention to climate issues and they help to establish a framework for identifying local risks and vulnerabilities, developing policy options, engaging the local public, and evaluating progress (Wheeler, 2008, pp. 482–483).

Published research on the climate change content of municipal plans has been strictly cross-sectional: it has created knowledge regarding the “current” status of plans at particular points in time, but has not provided insights into whether and how plans are evolving to keep pace with scientific understanding of climate change and its likely impacts. This represents an important knowledge gap for at least two reasons. First, reports indicate that the pace of global climate change has accelerated in recent decades (Balmaseda et al., 2013; Intergovernmental Panel on Climate Change, 2014), suggesting that planning policies that seemed aggressive 5–10 years ago might now be rendered outdated or inadequate. It is unclear whether municipalities are updating their plans to better incorporate increasing societal appreciation and understanding of climate risk and the urgency for action. Second, it is also unclear whether municipalities are taking climate risk seriously enough to respond by enhancing their plans with new and

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more aggressive goals and policies aimed at reducing local GHG emissions, protecting the local community through adaptation measures that respond to localized risks, and so on.

Scholars have called for longitudinal studies of municipal climate change plans and how they change over time, in part to help identify factors that contribute to improving the quality of existing plans (Tang et al., 2010, pp. 57–58). To our knowledge there have been no such studies published to date. We respond to this gap by examining whether, how, and why the climate change content of official community plans (OCPs)¹ from municipalities in the Canadian province of British Columbia (B.C.) changed from 2011 to 2015. Building on a study by Baynham and Stevens (2014) that examined the climate change content of 25 OCPs in 2011, we examine the same content in the same sample of plans, using updated versions of the plans as of 2015. This analysis enables us to determine whether and to what extent municipalities are keeping pace with climate change by adjusting their plans and policies in response to new and projected climatic conditions. We also explore factors that might explain observed changes in plan content over time, by using correlation analysis with data from a survey we conducted of municipal planners. We address two primary research questions: (1) How much did the plans change from 2011 to 2015, and (2) Which factors are associated with changes in the plans?

2. Municipal planning for climate change mitigation and adaptation

2.1. Information requirements for climate change mitigation and adaptation planning

Though climate change mitigation and adaptation planning are relatively new concerns for municipalities they have much in common with the more familiar municipal land use planning process. Municipal land use planning typically begins with the collection of relevant information about the local population, environment, and so on, and municipal climate change planning is no different in that respect. Municipalities use information in any planning process to help develop strategic policies aimed at furthering community goals.

In general, municipalities require very different information for mitigation planning than for adaptation planning. The foundational step in mitigation planning is the creation of a local GHG emissions inventory, which should contain information regarding the quantity and source (e.g. transportation, buildings, etc.) of local emissions, and a projection of future emission levels (e.g. under different scenarios and assumptions). Emissions inventories help municipalities to make decisions about which sources of emissions to tackle first, and provide “a quantitative baseline from which to measure progress on plan implementation” (Boswell et al., 2010, p. 452). Without access to this type of information, municipalities cannot make informed and strategic decisions regarding how to reduce their emissions in an effective (and cost-effective) way.

Planning for climate adaptation draws on much of the same information that planners have used in recent decades to plan for natural hazards (Berke and Stevens, 2016). First, adaptation planning requires information regarding the local hazards that a municipality faces as a result of climate change, such as sea-level rise, wildfires, or drought. Second, adaptation planning requires information regarding local vulnerability in the face of those hazards, including the vulnerability of particular geographic areas, subpopulations, and industries within the municipality. Though municipalities should seek to develop the most detailed information they can to support local adaptation planning, they might need to rely on regional projections of climate change

impacts when uncertainty is too high to support detailed localized assessments.

2.2. Factors that motivate municipal climate change planning

There is a growing sense of urgency for all municipalities to reduce their emissions and to protect themselves against climate risk. However, some municipalities are more likely than others to voluntarily engage in mitigation and/or adaptation planning in part because the costs of climate change and the benefits of activities intended to limit its impacts are unevenly distributed across space (Zahran et al., 2008). Brody et al. (2008) developed a three-part conceptual framework to help explain why municipalities might choose to engage in climate action, based on municipal characteristics. Their framework focuses on (1) *climate risk*, the extent to which a municipality is vulnerable to climate change impacts; (2) *climate stress*, the extent to which a municipality places stress on the climate and contributes to the scope of climate change (e.g. through GHG emissions); and (3) *climate opportunity*, the extent to which a municipality displays favorable social and civic characteristics that increase capacity and/or commitment for climate change planning.

Climate risk can possibly encourage municipal climate change planning by drawing attention to the potential costs a community might bear if it does not act in ways that help to reduce the scope of climate change impacts. Factors such as coastal proximity and a history of extreme weather events are potential indicators of climate risk that might motivate municipalities to engage in climate change planning (Brody et al., 2008). Coastal proximity renders municipalities vulnerable to sea-level rise, which is viewed as a common indicator of climate change due to thermal expansion and glacial melt (Patwardhan, 2006). Coastal communities might therefore have more awareness of climate change impacts because they are directly vulnerable to sea level rise, flooding, and coastal hazards that are expected to accompany climate change (National Research Council, 2014). Studies have found that coastal communities (Pitt, 2010; Wang, 2012; Krause, 2013; Lysák and Bugge-Henriksen, 2016) and municipalities that are aware of climate change impacts (Shi et al., 2015) do in fact seem to be more likely to engage in climate change planning. Coastal communities are not the only ones at risk, as inland municipalities are also adopting policy responses to other types of climate change impacts such as increasing temperatures and heat waves (Stone et al., 2012).

Climate stress is likely to discourage municipalities from engaging in climate change planning, as municipalities with high levels of GHG emissions might be committed to a particular form of economic development that would serve as a barrier. Municipalities that place a lot of stress on the climate are likely to be dependent on carbon intensive industries and/or to have high per capita GHG emissions levels (Brody et al., 2008). As a result, such municipalities might be less likely to engage in climate change planning because it might be relatively costly for them to deviate from their status quo (Zahran et al., 2008). Along those lines, there is some empirical evidence that municipalities with relatively heavy reliance on manufacturing employment are less likely to engage in climate change planning (Krause, 2010; Sharp et al., 2011).

Last, *climate opportunity* relates to factors that help to determine how successful municipalities will be in overcoming barriers to climate change planning. Scholars have conceptualized barriers to climate change planning in terms of three stages: understanding, planning, and management (Moser and Ekstrom, 2010). The *understanding* stage relates to being aware of the climate change problem and collecting the necessary information to develop a deep understanding of the problem and what needs to be done in response; the *planning* stage involves developing, assessing, and selecting response options; and the *management* phase involves implementing the selected response options and then monitoring and evaluating the results. Making it through these stages requires sufficient leadership, resources, and information (Hamin

¹ OCPs are the guiding land use and policy framework at the municipal level in B.C., and are comparable to what are sometimes referred to as “comprehensive plans”, “general plans” or “master plans” in other jurisdictions.

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