

<https://doi.org/10.1038/s44168-025-00260-3>

The current state of municipal climate action plans in effecting positive social justice outcomes in Canada



Nicola Radatus-Smith¹, Harshavardhan Jatkar²✉, Garrett T. Morgan¹, Imre Szeman¹ & Ian Hamilton²

Climate change is disproportionately impacting marginalised communities and exacerbating social injustices in Canada. Municipal Climate Action Plans (CAPs) are beginning to look at the challenges of the climate crisis and social injustices by incorporating language related to decolonisation, equity, diversity, and inclusion (DEDI) in their recommended actions. However, how DEDI is incorporated into CAPs remains underexplored. Therefore, this review evaluates the CAPs of 20 cities in Canada for the ways in which DEDI concerns are incorporated in their plans by using a framework that assesses the plans' development processes, collaboration with stakeholders, ownership of actions, and evaluation methods. Our analysis finds that, in general, Canadian municipal CAPs do not go far enough in addressing social injustices. The results indicate that there is an opportunity for Canadian cities to revise their existing CAPs to address the identified gaps during the implementation process in ways that maximise positive and just social outcomes.

Climate change poses significant and varied socio-ecological challenges to regions across Canada, with diverse impacts on different cities and communities¹. In particular, urbanised areas in Canada face high risks from exposure to the causes and effects of climate change, such as air pollutants and heat waves, which pose risks to human health¹. In response to these challenges, municipal governments across Canada are increasingly using Climate Action Plans (CAPs) to mitigate climate change and adapt to the social, environmental, and economic impacts of the climate crisis². In this paper, we use the term CAP to describe plans produced by municipal governments focused on climate action. Such plans may include actions related to both mitigation and adaptation; however, we particularly chose to investigate plans that are tackling climate mitigation because of the evident lack of equity considerations in relation to climate mitigation in CAPs. In Canada, where nearly half of the country's emissions are generated in cities, how municipalities approach climate action has implications both locally and nationwide^{3,4}. As some of the CAPs also aim for equitable climate action, there is a need to critically analyse how equity-related topics are being addressed in CAPs.

CAPs increasingly acknowledge decolonisation, equity, diversity and inclusion (DEDI), reflecting a global shift toward more inclusive and equitable approaches⁵. While scholars have already highlighted the importance of equitable climate action^{6,7}, this paper focuses on DEDI to reflect the developments in CAPs. As working definitions, this study refers to decolonisation as a means to bring about repatriation of Indigenous land and life⁸; equity as fair treatment measured through the equivalence of the

outcome/input ratio⁹; diversity as recognition, respect and celebration of differences among various individuals and communities¹⁰; and inclusion as the feeling of being welcome and valued¹⁰. The indicator framework developed in this study incorporates DEDI in a way that reflects the language and structure of Canadian CAPs.

Canadian CAPs refer to various DEDI concerns, including urban poverty, housing affordability, gender disparities, and marginalised identities including ethnic minorities, Indigenous Peoples, and refugees, among others. These issues often overlap with one another, e.g. urban poverty is often experienced by single-parent families, Indigenous Peoples, recent immigrants, visible minorities, older adults, women, and persons living with disabilities¹¹. Some of these conditions of vulnerability arise from identity-based discriminations, such as based on race and gender; while others arise from material conditions produced by social structures, such as poverty. While scholarship on climate change has conventionally explored gender and race impacts of climate change, such exploration has tended to ignore the impacts on such groups of people that fall at the intersection of gender and race. Thus, the concept of intersectionality has found prominence in exploring structural injustices experienced at the intersection of various social identities^{12–14}. Sometimes, climate action can exacerbate racial, ethnic, and class divides through discriminatory land use, housing, public health, and environmental protection policies^{15,16}. To constrain the expansion of existing structural injustices and the risk of introducing new damages, it is critical that CAPs engage with these issues and have the intention to address existing challenges to realize climate-positive and intersectionally just outcomes¹⁷.

¹University of Toronto, Toronto, ON, Canada. ²University College London, London, UK. ✉e-mail: h.jatkar@ucl.ac.uk

As the number of cities with formal CAPs continues to grow, analysts have increasingly explored how these plans are designed, implemented, and evaluated^{3,18–22}. The theoretical framing and methodological tools deployed by these assessments range considerably, from those that focus on the energy use of municipal buildings to those that explore how non-human actors are addressed in the CAP development and implementation process. While we acknowledge the range of approaches available, an exploration of the entire range of the ways in which CAPs have been evaluated is beyond the scope of this article. Instead, we focus specifically on how CAPs frame and pursue equity and justice issues using a DEDI framework.

Guyadeen et al.²¹, for example, evaluate Canadian CAPs in terms of plan quality by looking at strengths and weaknesses based on ‘fact base, goals, policies, implementation, monitoring and evaluation, inter-organizational coordination, participation, and plan organization and presentation’. Going beyond indicators of a ‘good plan’²¹, Angelo et al.¹⁸ and Hess et al.²⁰ analyse the extent to which sustainability and climate policies engage with issues of equity. Other studies have also analysed CAPs using a three-pillar justice framework, comprising recognitional, distributive, and procedural justice pillars^{19,22,23}. Together, these studies highlight the importance of considering the plan’s structure and language in analysing the city’s climate justice goals, the types of issues considered, and the effectiveness of plan implementation. Yet, to account for contemporary rubrics through which CAPs are advancing the agenda for equity and justice, this study uses the DEDI framework to analyse CAPs.

CAPs are designed to shape how cities address and engage with communities on climate change. Progress on meeting their objectives, however, is limited and highly contingent on local contexts and enabling conditions^{24–26}. As O’Donnell & Doyon²² argue, evaluations of plans should go beyond language and investigate indicators of change within the plans to ensure effective change. As argued by Shi et al.²⁷, without clearly defined and measurable indicators, claims of equity and justice in CAPs risk becoming window-dressing branding exercises rather than deep-seated institutional and policy priorities. Without measurable indicators, equity and justice frameworks can become tokenistic and not bring about the intended positive change. Furthermore, Moser & Ekstrom²⁸ argue that ensuring ownership of climate action generates a sense of accountability and raises interest in climate action, a principle that can be utilised to generate positive DEDI outcomes. Therefore, there is a need to analyse the use of DEDI-related concepts used in Canadian CAPs, by linking them to the indicators of ‘plan quality’ as developed in planning literature²¹.

To analyse the status and proposals for DEDI in Canadian CAPs, this paper explores three main research questions:

- (1) How do Canadian municipal climate action plans describe and seek to address DEDI?
 - a. Which DEDI-related issues are being considered?
 - b. Which groups/communities are being considered in CAPs within the DEDI framing?
- (2) How do CAPs describe their development and understanding of DEDI?
- (3) How do CAPs seek to address issues through climate actions?

To answer these questions, this study developed an indicator framework comprising four themes – namely (1) the Process by which plans were developed, (2) Collaboration with stakeholders, (3) Ownership of actions, and (4) Evaluation methods explicitly mentioned in the plans to track the progress of DEDI implementation. These four themes are built on the literature on the ‘plan quality’ framework²¹ to help incorporate and track the DEDI agenda. The Process theme evaluates whether different constituent communities and their needs were considered while making the plans, by analysing the language and structure of the plans. The Collaboration theme assesses whether CAPs reflect local needs through the involvement of constituent communities, highlighting the importance of inclusive planning. Ownership examines accountability and resource allocation, ensuring that commitments to DEDI goals are actionable rather than just aspirational. Finally, the Evaluation theme measures the presence of

tracking mechanisms to assess progress towards stated DEDI goals, though it acknowledges that the effectiveness of these methods may vary. By analysing these themes, the framework aims to ensure that CAPs are not only well-intentioned but also effective in achieving equity-driven climate action.

This study focuses on cities with over 200,000 population. The twenty selected cities are reviewed in relation to how they articulate goals encompassing DEDI and how they propose to pursue these goals while mitigating climate change. CAPs were evaluated using the four themes mentioned above. Each of the four themes consists of 2–8 indicators, each of which is scored along the scale (lowest) 0–3 (highest). The evaluation was carried out by the authors and the results are presented in the following section. Though there is a level of subjectivity in the evaluations, this paper presents a comprehensive framework for analysing DEDI in CAPs for Canada.

Critically, this analysis does not intend to assess if these proposed strategies are being implemented in practice, but whether the plans intend to and embed strategies for implementing and tracking progress on DEDI. Determining the nature and quality of implementing DEDI-related efforts would instead be the subject of a future progress evaluation. By examining the structure and content of municipal CAPs under the selected themes, this paper offers a benchmark of DEDI, so that CAPs can be further improved more systematically. In a context where the majority of cities around the world do not incorporate climate equity or justice in their CAPs⁵, this study presents baseline evidence for advancing DEDI in Canada and beyond. Moreover, while authors have called for lessening the inequality impacts of CAPs²⁹, this article argues for ‘climate positivity’ aimed at planning and designing CAPs to have positive impacts on DEDI rather than simply lessening their negative implications.

Results

In this section, we elaborate on the results of the assessment using the indicator framework developed for this study. Our results show that though Canadian cities do aim to address DEDI in their CAPs, there is a range of ways in which cities operationalise DEDI to achieve climate-positive outcomes. Although plans include DEDI language within CAPs, most assessed cities do not achieve high scores within the evaluation criteria due to limitations in the plan’s descriptions and transparency or lack of tangible actions to enable DEDI positivity impacts. The following section shows the aggregate scores for the twenty studied cities and elaborates high-scoring CAPs along each of the four themes of the indicator framework.

Framework analysis

Among the four evaluated themes, Process, Collaboration, Ownership, and Evaluation, the top performing cities, Vancouver, Surrey, Markham, Calgary, and Toronto, have set a high standard with their overall scores of 66.3, 62.9, 60.6, 51.9, and 41.3 out of 100, respectively. Figure 1 represents a breakdown of each city’s performance for each theme.

Process

The theme measuring the use and depth of equity language in the plans, ‘Process’ scored the highest on average across the four themes. Within this theme, many CAPs included comprehensive DEDI terminology throughout the plans. However, in some cases, only limited terms such as ‘equity’ or ‘vulnerable’ were used. Instead, the City of Markham scored high by including a dedicated section to define social equity. This section provides local context on the types of inequities that can occur, explicitly highlights the current state of inequities in the city itself, and outlines objectives for tackling inequities through climate action³⁰. By doing so, the City of Markham stood out for including such elements that were missing in most other plans. In contrast, Regina had ‘equity’ as a general DEDI objective when implementing climate action but no articulation of DEDI evidence to inform climate actions or objectives³¹.

Evaluation

Evaluation, the theme focused on the use of success metrics articulated in the plans, scored second out of the four themes on average across the plans.

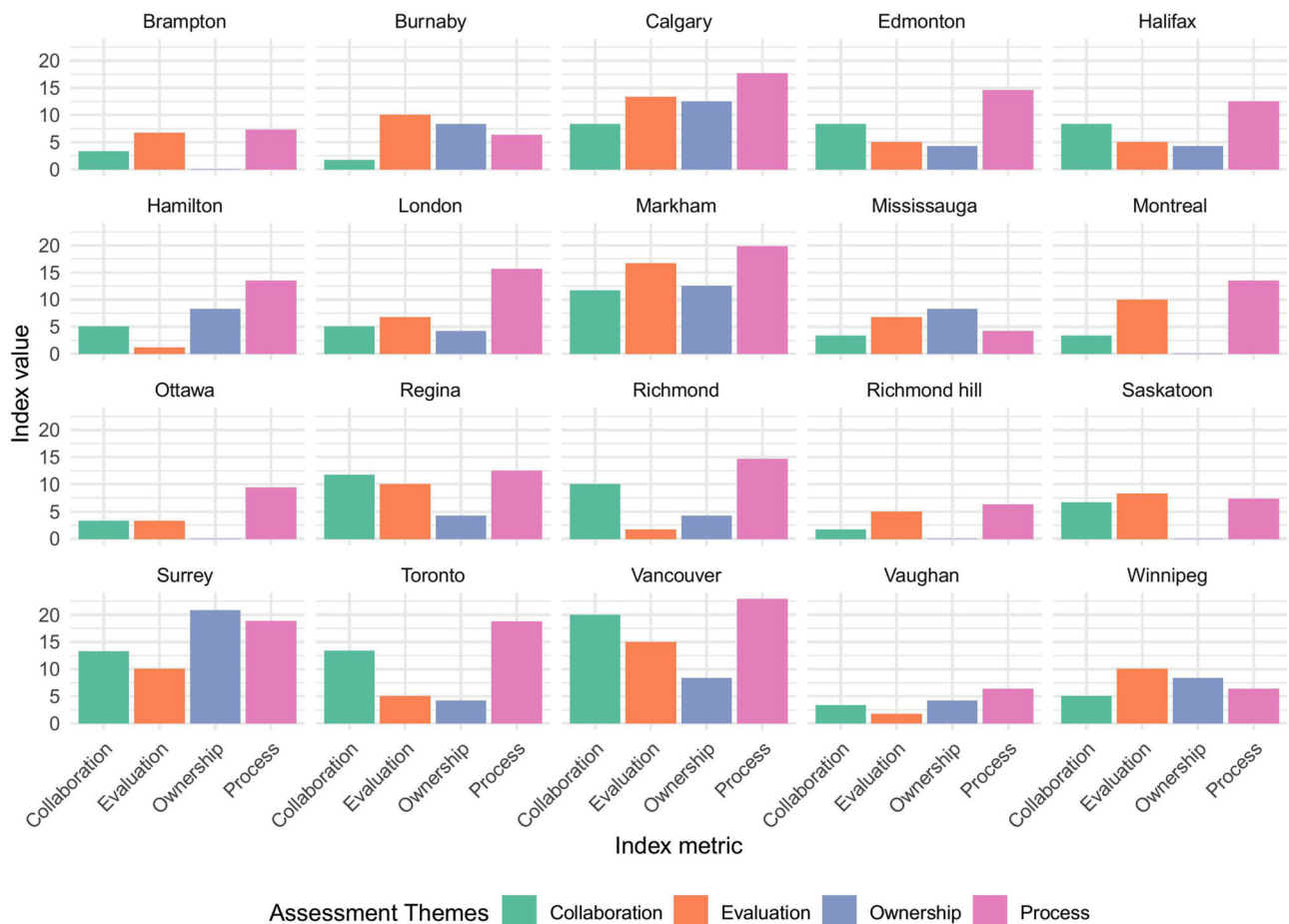


Fig. 1 | Assessment themes. Collaboration; Evaluation; Ownership; Process.

Calgary, to some degree, addressed all categories in its plan, however, their descriptions of desired outcomes, such as “improve equitable access to natural infrastructure”³², were rather vague. The plan was also one of the few with equity-related metrics aiming to eliminate energy poverty by 2050 with an interim 2030 target³². Most plans that performed strongly in this theme included an explicit strategy for updating the plan over time and including or intending to include progress updates for specific actions.

Collaboration

The theme measuring who contributed to plan creation and how, ‘Collaboration’, scored third across the plans on average. Within this theme, cities describing the participants involved in the planning process performed the best. However, participant descriptions often lacked clarity regarding equity-deserving groups’ roles in plan development.

The City of Vancouver provided significant details in its plans, contributing to its high score on this theme. For example, the plan provided details about who was engaged, detailing the broad inclusion of equity-deserving groups in the equity working group, the majority being non-White populations³³. The City also acknowledged that missing voices needed greater inclusion, such as those of specific “Indigenous groups, youth, and LGBTQ+” individuals³³. Additionally, Vancouver’s plan includes details on how they reached out to communities and details on the engagements. As in other plans, an element that was low scoring was directly linking outcomes to what was presented in the plan to reflect community issues.

Ownership

Ownership, the theme evaluating the degree of accountability articulated in the plans, scored lowest across the plans on average. An exception was the City of Surrey, which performed well by designating clear responsibilities for

achieving each action, including a lead division and support division and an internal accountability system to track progress³⁴. Moreover, the City’s CAP made funding strategies explicit to help them achieve climate action³⁴.

Twelve of the twenty plans, however, had little to no evidence of including Ownership elements demonstrated by a score of 1 or less for that theme. Some cities, such as Brampton, Richmond Hill, and Saskatoon, lacked clear DEDI objectives, resulting in no direct link to resources or team responsibilities related to DEDI.

Content analysis

In this section, we elaborate on the results of quantitative content analysis conducted to identify the terminology used by various cities to elaborate DEDI concerns. Our results show that the approaches to DEDI concerns varied greatly across the assessed cities. DEDI concerns appear to be referred to in CAPs in two types of terminologies, namely generic and overarching terms such as ‘underserved communities’ and specific socio-economic groups such as ‘low-income’ or ‘seniors/elderly’. The section below elaborates on the use of both these types of terminologies as they relate to DEDI.

Twenty groups were identified across municipal CAPs from the evaluated plans, as summarised in Table 1. Most plans used overarching terms to describe constituent communities; for example, the City of Regina used ‘equity-seeking’ when referring to co-benefits of an action, promoting more equitable planning processes by including equity-seeking groups³¹. Some CAPs addressed specific identities and social determinants that would result in groups being disproportionately impacted. For example, ‘equity-deserving’ was used in Toronto’s CAP when talking about electric mobility, “consideration for equity-deserving groups, including low-income residents, seniors, and persons with disabilities, will be made to impact these communities positively”³⁵. Similarly, Surrey used the terms ‘equity-seeking’

Table 1 | Matrix table of Decolonisation, Equity, Diversity, and Inclusion (DEDI) groups identified in the Climate Action Plans (CAPs) by city

Groups	Cities																				Total
	Toronto	Montreal	Calgary	Ottawa	Edmonton	Winnipeg	Mississauga	Vancouver	Brampton	Hamilton	Surrey	Halifax	London	Markham	Vaughan	Saskatoon	Burnaby	Regina	Richmond	Richmond Hill	
Vulnerable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	19
Underserved communities						✓		✓												✓	3
Traditionally underrepresented	✓																				1
Equity-seeking					✓						✓							✓			3
Equity-deserving	✓		✓																		2
Equity-denied											✓										1
Marginalised	✓					✓		✓	✓	✓		✓				✓					7
Racialised	✓		✓					✓			✓	✓	✓								6
Indigenous/First Nations	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓		14
Visible Minorities					✓			✓						✓					✓		4
(Im)migrants	✓		✓			✓		✓			✓			✓							6
Refugee	✓										✓										2
Low-income (underemployed)	✓	✓	✓		✓	✓		✓		✓	✓		✓	✓	✓		✓		✓		13
People experiencing homelessness	✓	✓									✓		✓								4
Children/youth	✓	✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓		14
Seniors/Elderly/Older adults	✓	✓				✓	✓	✓				✓	✓	✓		✓			✓		10
Age			✓								✓		✓	✓							4
(Dis)ability	✓	✓	✓			✓		✓			✓	✓	✓	✓					✓		10
Gender	✓	✓	✓		✓			✓					✓								6
2SLGBTQ+	✓		✓					✓			✓										4
Religion, Culture, Tradition		✓	✓					✓			✓										4
Total	15	8	11	1	7	9	4	14	3	5	14	7	9	8	4	4	1	4	7	2	

or 'equity-denied' when discussing how equity will be integrated into climate actions and provided a description for what they mean by the terms, such as groups of people facing systemic barriers impacting their well-being and access to resources and included a substantive list of the various groups, they consider to fit this description³⁴. Table 1 presents all DEDI-related terms in the different municipal CAPs.

While many plans generically mention terms such as 'vulnerable' and 'equity-deserving', certain specific groups have received more widespread recognition across the twenty cities. The most widely recognised group includes Indigenous/First Nations (14/20), children/youth (14/20), and low-income populations (13/20), followed by seniors/elderly (10/20) and people with disabilities (10/20). While race and gender are recognised to some extent (6/20), 2SLGBTQ+ (4/20), religion, culture and tradition (4/20), immigrants (4/20), homeless (4/20) and refugees (2/20) are least recognised across the twenty cities. The overall recognitional distribution across twenty cities shows that there is scope for the low-scoring cities to consider the inclusion of certain groups of people in their CAPs. It must also be noted that CAPs often use the term 'racialized people'³⁵ without specifying the groups to which they refer. Overall, recognition of specific vulnerable or equity-deserving groups needs to be further articulated and addressed in intersectional terms^{36,37}.

Fourteen DEDI issues were mentioned in the plans (summarised in Table 2). Health outcomes were considered across all plans (20/20). The second most recognised issue was housing affordability (14/20). For example, Edmonton addressed it when referring to building efficiency action to prioritise affordable housing alongside energy-efficient housing³⁸. The City of Ottawa similarly mentioned affordability-related impacts, pointing out that participation in the energy transition is not accessible to all due to poverty and affordability³⁹. The third most recognised issue was employability and access to employment (13/20). For example, within the action to build social capital, Montreal described that the transition must be just for workers in all sectors, ensuring that access to employment hubs is established, and providing opportunities for transfer skills where needed⁴⁰.

Access and affordability of transit options were also discussed widely (13/20). In Surrey's CAP, for instance, one of its 2050 visions included making neighbourhoods diverse and walkable, and public spaces more inclusive³⁴. Energy poverty was also equally recognised as a concern (13/20). Calgary's CAP, for example, recognised the need to consider energy poverty in the design and implementation of climate actions³². Structural injustices were the least recognised (2/20). Toronto, for example, recognised the structural challenges that could impact the municipal government's ability to invest in climate action, such as power dynamics between various actors and its access to resources and infrastructure. Moreover, Toronto's CAP also recognised that addressing structural inequities like poverty and marginalisation is essential to protect people from rising costs of energy, food, and housing³⁵.

Despite the recognition of various issues, Canadian CAPs are more focused on equity and the distribution of resources through considerations of poverty, affordability and employment. Considerations of decolonisation, diversity and inclusion appear less predominantly through the issues of inclusion in participation (12/20), reconciliation (9/20), language and accessibility (5/20), structural inequalities (2/20), and inclusive public spaces (1/20). This shows that there is scope for incorporating decolonisation, diversity and inclusion in CAPs. The various DEDI-related issues discussed in the twenty CAPs are presented below in Table 2.

Discussion

CAPs in Canada vary in their use of the DEDI language. While all assessed plans aim to address citizen needs in the face of climate change, some stand out for their integration of DEDI principles, like those of Vancouver, Surrey, and Markham. These plans prioritise collaboration between the city and communities informed by local contexts and demonstrate a clear understanding of local needs, incorporating intersectional considerations for addressing climate change. In contrast, other plans, such as those of Richmond Hill, Vaughan, Burnaby, and Ottawa, tend to focus narrowly on emissions reduction without addressing DEDI issues in any substantive way.

Table 2 | Matrix table of Decolonisation, Equity, Diversity, and Inclusion (DEDI) issues identified in the Climate Action Plans (CAPs) by city

Issues	Cities																				Total
	Toronto	Montreal	Calgary	Ottawa	Edmonton	Winnipeg	Mississauga	Vancouver	Brampton	Hamilton	Surrey	Halifax	London	Markham	Vaughan	Saskatoon	Burnaby	Regina	Richmond	Richmondhill	
Structural inequities (social conditions)	✓		✓																		2
Inclusion in participation (awareness and access)	✓	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓					✓	12
Distribution of and access to benefits	✓	✓	✓		✓				✓	✓	✓	✓	✓				✓			✓	11
Transit and walkable neighbourhoods (access and affordability)	✓	✓			✓	✓	✓	✓	✓		✓		✓	✓	✓			✓		✓	13
Language and accessibility						✓		✓			✓			✓					✓		5
Poverty	✓	✓		✓	✓			✓			✓	✓									7
Energy poverty	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓				✓		✓	✓	13
Housing affordability	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓		✓		✓		14
Employability and access to employment opportunities	✓	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓	✓				✓		13
Food affordability and accessibility	✓	✓	✓		✓	✓		✓	✓		✓		✓	✓							10
Reconciliation	✓		✓			✓		✓			✓	✓	✓		✓				✓		9
Health outcomes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20
Inclusive public spaces											✓										1
Intergenerational equity		✓				✓									✓			✓		✓	5
Total	11	10	9	4	9	8	3	10	7	5	12	5	8	7	7	2	3	4	6	5	

When looking at each of the assessed themes, this study identified multiple areas in which CAPs can be improved for better DEDI considerations. CAPs scored the highest in the theme Process because including the DEDI language is relatively easy. However, scoring high for Process does not guarantee that the plan is likely to achieve DEDI²⁵. Across all evaluated plans, there are inconsistencies in how DEDI is described, with many plans needing clearer objectives or more actionable strategies. The use of terms was limited, with terms like ‘equity’ often not having a clear definition or plan for implementation. While plans do recognise certain vulnerable populations as shown in Table 1, there is a need for creating plans that describe local challenges related to DEDI and articulate intersectional climate action^{36,37}. Developing plans based on existing demographic patterns would also prevent the DEDI language from being tokenistic.

As participation is a fundamental step during the climate action planning process, this study highlights the need to describe how stakeholders were engaged throughout the development process, assessed under the theme of Collaboration. Describing the process of stakeholder engagement would help assess the nature of engagement and its usefulness in incorporating diverse perspectives in the planning and implementation process^{23,25}. At present, a notable absence of authentic inclusion of equity-deserving communities indicates a need for procedural justice improvements.

Ownership, referring to the distribution of responsibilities and dedicated resources, could be further improved in most plans. Without clear DEDI objectives, it is not easy to allocate resources effectively. Moreover, among the plans that specify DEDI objectives, only a few plans include targets or metrics for tracking progress. While some plans articulate which departments and financial resources are allocated towards specific DEDI goals and actions, plans need to identify who is responsible and what resources will be put towards achieving positive DEDI outcomes¹⁸. This analysis thus supports the scholarly claim that plans must include evaluative metrics to demonstrate their commitment to justice^{19,21,26}.

Overall, DEDI-related issues and groups described in the literature were reflected throughout CAPs. However, CAPs do not describe DEDI-related issues in a comprehensive and intersectional way. Most of the issues

mentioned were related to distributive and procedural justice, and recognition justice issues were much less prevalent. Moving forward, CAPs would benefit from a thorough analysis of existing DEDI challenges, considering intersecting factors like race, ethnicity, gender, age, sexual orientation, immigration status and income. Recognising Canada’s history of colonialism and immigration, it is crucial for plans to address structural inequities related to Indigenous peoples, migrants and refugees⁴¹. While some plans acknowledge systemic issues, most fail to address them comprehensively. Indigenous reconciliation, for example, is discussed only in a minority of plans despite being a prominent DEDI issue in Canada¹¹. While scholars and social movements have shown the value of community-led as opposed to state-led reconciliation processes⁴², CAPs do not particularly highlight how reconciliation will be implemented. Moreover, while vulnerable populations are often mentioned in a general sense, specific issues related to some marginalised groups, such as ethnic minorities, remain overlooked. Cities also have a responsibility beyond municipal boundaries whereby the processes and systems that dominate the design and operations of cities impose inequities on rural and Indigenous communities who, as a result, are disproportionately impacted by climate change⁴³. CAPs could also do better in their awareness and acknowledgement of the interconnectedness of existing systems of oppression that have created the conditions for many inequities to exist to prevent perpetuating such inequities through climate policy⁴¹.

The approaches to creating CAPs in Canada differ, and therefore, plans are often presented in diverse ways, with different levels of progress towards DEDI. Policies on equity are frequently drawn from municipal climate action best practice guides or reused from consultants, which can result in generalised approaches rather than addressing local challenges⁴⁴. However, collaboration and using existing resources can be beneficial guides to support cities in creating plans tailored to their local needs. For example, the David Suzuki Foundation produced a resource for cities that can help cities integrate and operationalise equity in climate actions⁴⁵. Developing resources like the framework used in this analysis can guide cities in creating intersectional plans that authentically represent and include the populations burdened with structural injustices and at risk of negative impacts of climate

change. Doing so can lead to consistency in how DEDI is embedded into CAPs across Canada while allowing for the consideration of context-specific challenges. This support is needed to ensure that planning, where most financial resources are prioritised, can account for the implementation to realize the goals that are outlined⁴⁴. Academically, this paper furthers the discussion on plan evaluations by generating a DEDI framework for analysis of CAPs that can be used to track and progress equity and justice in climate actions through planning.

Funding availability, demographics, and dimensions of municipal governance all shape how Canadian cities approach climate action and what is presented in the plans. Our analysis identifies the potential for CAPs to continue to progress toward intersectional considerations that can become transformational in how cities mitigate climate change. We acknowledge that it is beyond the scope of this evaluation to investigate the impacts of these dimensions on the resultant plans. Future research in this area can focus on developing indicators to help cities measure and evaluate the impact of their climate action policies on equity-deserving communities.

Methods

To determine how well DEDI issues are addressed in CAPs, CAPs from the largest cities in Canada were evaluated in two ways. First, a framework was developed based on the thematic areas: Process, Collaboration, Ownership, and Evaluation, see Supplementary Table 1. The second stage of evaluation assessed the content of the plans to determine the types of groups and issues related to DEDI that are present. In the below section, we elaborate on the development of the theoretical framework, the inclusion and exclusion criteria, and the data analysis methods.

Theoretical framework development

The developed framework intends to evaluate DEDI considerations in CAPs through the themes of Process, Collaboration, Ownership, and Evaluation. The framework was developed to evaluate how cities describe DEDI, and which groups and DEDI-related issues are being considered in CAPs. Within each theme, several indicators were identified to evaluate the incorporation of DEDI and guide cities in articulating and tracking equity in their CAPs.

The purpose of evaluating the theme of Process is to assess the inclusion, understanding, and use of DEDI language throughout the process of making plans. Adapted from previous studies, the language used to code the CAPs is derived from common DEDI terms presented across plans and in the literature, to measure the degree to which such terms appear in plans^{18,19,22,23}. A CAP that uses DEDI statements and language demonstrates that such issues were considered. Disclosing the intention to address such issues and including DEDI language is considered a first and necessary step.

While including DEDI language in CAPs is important, generating collaborations among various stakeholders is key for effective implementation and long-term impact of the plans. CAPs are created through the collaboration of various stakeholder groups. CAPs that intend to have positive social impacts should reflect local needs which would occur through the involvement of constituent communities in the plan's creation²⁵. Therefore, the theme of Collaboration aims to measure the inclusion of DEDI community voices during the planning process. Developing plans through collaboration with various stakeholders hints towards the potential incorporation of constituent communities in the plan²³. When plans include evidence of collaboration, it adds a connection to the communities that the plans are meant to serve.

Ownership of CAPs is key to accountability and interest in climate action²⁸. Furthermore, the success of CAP's intentions and goals related to DEDI is more likely when there are established accountability metrics in place. Therefore, we aim to assess a demonstrated commitment to achieving DEDI outcomes through accountability and resource allocation¹⁸. Plans gain legitimacy in municipal commitments to achieving DEDI outcomes when they clearly articulate accountability.

Beyond statements of their intentions and goals, it adds a layer of assurance that the plans will follow through on their commitments.

The plans are evaluated on what they say they are accountable for, however, without tracking measures the progress towards achieving the goals cannot be verified. Plans can illustrate methods for tracking and evaluating progress and doing so demonstrate further accountability and commitment to achieving the goals set out in the plan^{19,26,46}. Therefore, we assess the plans through the theme Evaluation, by verifying the presence of tracking and evaluation mechanisms to measure and track progress towards stated DEDI goals.

Inclusion and exclusion criteria

Canadian municipalities were selected for the evaluation based on population size greater than 200,000, the presence of a CAP or a mitigation strategy, and the inclusion of a social justice lens. Mitigation strategies are defined as plans that aim to reduce GHG emissions. Often municipal mitigation-specific strategies are called energy strategies since the primary focus is to mitigate GHG emissions by transitioning their systems that rely on carbon-based energy sources. The inclusion of a social justice lens was determined based on a preliminary coding analysis of the plans for the use of DEDI language.

Cities were selected using the 2021 census data which highlighted 27 cities that met the criteria for population size. The population threshold for cities was determined to sample a range of cities and included factors such as demographic diversity and geographic and climate variability. Statistics Canada has stated that Census Metropolitan Areas (CMAs), which the 27 cities are listed as such, have a higher proportion of the DEDI groups and are more likely to represent these groups and associated issues in their CAP⁴⁷. Furthermore, Canada's varied geographies contribute to differing climate impacts on cities. Therefore, we are not trying to compare the context of the plans as this varies greatly across Canada; instead, we aim to shed light on the status of cities across Canada in relation to their climate action efforts. There is a significant difference in population sizes among cities within these criteria. The largest city has a population of 2.79 million, while the smallest has only 208,370 residents. This disparity can lead to varying approaches in addressing DEDI and climate action. For the cities that met the population criteria, municipal websites were searched for published climate action plans or mitigation strategies. Cities that had a CAP or a similar document were selected for analysis. The approach to presenting and reporting on climate action varies widely among cities. Some have comprehensive climate action plans or sustainability strategies, while others have plans specifically focused on climate adaptation or mitigation. This paper is particularly interested in mitigation actions. Therefore, we included cities with mitigation plans even if they did not have a comprehensive CAP, or if their CAPs did not include or explicitly mention mitigation actions.

The published CAPs were briefly analysed using coding methods to identify the inclusion of DEDI language. If such language was present, the plans were included in the final selection. The framework was designed to evaluate the inclusion of DEDI considerations based primarily on the language used and the content articulated within the plans. Therefore, if plans do not initially state any topics related to DEDI, the evaluation would not be possible. After selecting against the criteria 20 plans were included in the analysis, outlined in Supplementary Table 2.

Data collection and analysis

First, data was collected from the selected CAPs that corresponded to what was being evaluated in the developed framework. Due to the lack of standardisation of CAPs, each plan underwent manual text-mining for the inclusion of content being evaluated in the developed framework. The data being collected was quantitative by means of scoring various categories associated with the four themes, as outlined in the framework. Within each theme and corresponding categories, scores were given based on the scoring criteria described in the framework. Scores were allocated on a scale of 0–3, where a score of 0 was assigned if the plan did not contain the metric being evaluated and a score of 3 was assigned for plans with the most robust inclusion of a given metric. Robust signifies that the metric was articulated in detail and the content aligned with best practices consistent with the recent

literature. A scaling method was chosen to allow for comparative analysis across themes within each plan and across plans. A scale of 3 was used to provide consistency in the scoring methodology, resulting in three broad but clearly defined criteria in which a plan can be evaluated on a particular category within each theme.

Once the data was collected in the evaluation, a comparative analysis was conducted. As there are four themes and categories within each theme, different analyses were undergone to analyse different aspects of the results. First, individual plans were compared across themes. For each plan evaluated, the scores allocated to each category were aggregated to provide a total score for each theme. A weighting of 25 was given to each of the four themes scores were derived from equally weighing each theme to equal a possible maximum of 100 points and applied to their total scores to allow for comparison across the themes. The adjusted scores produced four values corresponding with the four themes which were used to compare the performance of each theme in relation to each other and across plans. The total value of the themes was also summated to determine the highest-scoring plan overall. Individual bar graphs were created with the adjusted theme scores to compare each theme within each plan and across plans.

The second stage of the analysis focused on the categories within each theme. Average scores across the plans were calculated to evaluate their performance. Scores were not adjusted. Instead, they reflect the original scoring metrics consisting of a maximum of 3 points per category. This was done to indicate the type of information presented in the plans that contributed to the performance of each theme.

While undergoing data collection, a separate manual text-mining was conducted to collect data on explicitly mentioned DEDI issues and groups. Plans were examined for the inclusion of described issues and groups related to DEDI, when mentioned these issues and groups were noted and gathered to create comprehensive lists for each of the two topics. The plans were reevaluated using the lists of groups and issues to code the plans to ensure data was effectively captured on which city plans had mentioned each issue and group. The identified groups were then aggregated and analysed based on the number of groups mentioned per plan, which groups were mentioned per plan, the total number of groups mentioned per plan, and number of plans mentioning each group. The same analysis was undertaken for the identified DEDI issues. This provided an understanding of the most common issues and groups as well as which cities were inclusive of their incorporation in the plans. Further, it allowed for awareness of gaps in which groups and issues deemed important to address are not mentioned.

Data availability

No datasets were generated or analysed during the current study.

Received: 2 December 2024; Accepted: 31 May 2025;

Published online: 17 June 2025

References

- Government of Canada. Canada's Changing Climate Report. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/Climate-change/pdf/CCCR_FULLREPORT-EN-FINAL.pdf (2019).
- Russo, C. & Pattison, A. Climate Action Planning (CAP): An intersectional approach to the urban equity dilemma. in *Systemic Crises of Global Climate Change: Intersections of race, class and gender* (eds Godfrey, P. & Torres, D.) 250–262 (Routledge, London, 2016).
- Federation of Canadian Municipalities. *Partners for Climate Protection*. <https://fcm.ca/en/programs/partners-climate-protection> (2024).
- Federation of Canadian Municipalities. *Climate and sustainability*. <https://fcm.ca/en/focus-areas/climate-and-sustainability> (2024).
- Aboagye, P. D. & Sharifi, A. Post-fifth assessment report urban climate planning: Lessons from 278 urban climate action plans released from 2015 to 2022. *Urban Clim.* **49**, 101550 (2023).
- Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P., O'Brien, K., Schroeder, H., Tschakert, P., Clapp, J., Keck, M., Biermann, F., Liverman, D., Gupta, J., Rahman, A., Messner, D., Pellow, D. & Bauer, S. Why equity is fundamental in climate change policy research. *Glob. Environ. Change* **44**, 170–173 (2017).
- Reckien, D., Creutzig, F., Fernandez, B., Lwasa, S., Tovar-Restrepo, M., Mcevoy, D. & Satterthwaite, D. Climate change, equity and the Sustainable Development Goals: An urban perspective. *Environ. Urbanization* **29**, 159–182 (2017).
- Tuck, E. & Yang, K. W. Decolonization is not a metaphor. *Decolonization: Indigeneity Educ. Soc.* **1**, 1–40 (2012).
- Cook, K. S. & Hegtvedt, K. A. Distributive justice, equity, and equality. *Annu. Rev. Sociol.* **9**, 217–241 (1983).
- The University of Edinburgh What does equality, diversity, and inclusion mean? Retrieved from The University of Edinburgh website <https://www.ph.ed.ac.uk/equality-diversity-and-inclusion/about-ed/what-does-equality-diversity-and-inclusion-mean> (2025).
- Seidle, L. *The Federal Role in Canada's Cities: Overview of Issues and Proposed Actions*. Canadian Policy Research Networks Inc. (CPRN). https://www.homelesshub.ca/sites/default/files/Federal_role_in_Canada's_Cities-Overview_of_Issues_and.pdf (2002).
- Rudge, K. Leveraging critical race theory to produce equitable climate change adaptation. *Nat. Clim. Change* **13**, 623–631 (2022).
- Djoudi, H., Locatelli, B., Vaast, C., Asher, K., Brockhaus, M. & Basnett Sijapati, B. Beyond dichotomies: gender and intersecting inequalities in climate change studies. *Ambio* **45**, S248–S262 (2016).
- Osborne, N. Intersectionality and kyriarchy: a framework for approaching power and social justice in planning and climate change adaptation. *Planning Theory* **14**, 130–151 (2015).
- Cannon, C., Chu, E., Natekal, A. & Waaland, G. Translating and embedding equity-thinking into climate adaptation: An analysis of US cities. *Regional Environ. Change* **23**, 30 (2023).
- Smit, B. & Pilifosova, O. Adaptation to climate change in the context of sustainable development and equity. *Clim. Change, Adapt. Capacit. Dev.* **8**, 879–906 (2003).
- Singleton, B. E., Rask, N., Magnusdottir, G. L. & Kronsell, A. Intersectionality and climate policy-making: the inclusion of social difference by three Swedish government agencies. *Environ. Plan. C* **40**, 180–200 (2022).
- Angelo, H., MacFarlane, K., Sirigotis, J. & Millard-Ball, A. Missing the Housing for the Trees: Equity in Urban Climate Planning. *J. Plan. Educ. Res.* **44**, 1415–1430 (2022).
- Diezmartinez, C. V. & Short Gianotti, A. G. US cities increasingly integrate justice into climate planning and create policy tools for climate justice. *Nat. Commun.* **13**, 5763 (2022).
- Hess, D. J. & McKane, R. G. Making sustainability plans more equitable: An analysis of 50 U.S. Cities. *Local Environ.* **26**, 461–476 (2021).
- Guyadeen, D., Thistlethwaite, J. & Henstra, D. Evaluating the quality of municipal climate change plans in Canada. *Clim. Change* **152**, 121–143 (2019).
- O'Donnell, E. & Doyon, A. Language, context, and action: Exploring equity and justice content in Vancouver environmental plans. *Local Environ.* **28**, 1478–1495 (2023).
- Fitzgerald, J. Transitioning from urban climate action to climate equity. *J. Am. Plan. Assoc.* **88**, 508–523 (2022).
- Hui, I., Smith, G. & Kimmel, C. Think globally, act locally: Adoption of climate action plans in California. *Climatic Change* **155**, 489–509 (2019).
- Laws, G. Urban policy and planning as discursive practices. *Urban Geogr.* **15**, 592–600 (1994).
- Caggiano, H., Kocakuşak, D., Kumar, P. & Tier, M. O. U.S. cities' integration and evaluation of equity considerations into climate action plans. *Npj Urban Sustainability* **3**, 1–9 (2023).
- Shi, L. et al. Roadmap towards justice in urban climate adaptation research. *Nat. Clim. Change* **6**, 131–137 (2016).

28. Moser, S. C. & Ekstrom, J. A. Taking ownership of climate change: participatory adaptation planning in two local case studies from California. *J. Environ. Stud. Sci.* **1**, 63–74 (2011).
29. Markkanen, S. & Anger-Kraavi, A. Social impacts of climate change mitigation policies and their implications for inequality. *Clim. Policy* **19**, 827–844 (2019).
30. City of Markham. *Markham's greenprint Sustainability Plan*. Retrieved from City of Markham website: https://www.markham.ca/wps/wcm/connect/markham/bc001a0d-6091-4fcc-8473-aafb65e67677/3+-+GreenPrint%2BFINAL%2BPlan_2011.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_2QD4.H901OGV160QC8BLCRJ1001-bc001a0d-6091-4fcc-8473-aafb65e67677-nEgufv (2011).
31. City of Regina. *Energy & Sustainability Framework: Energy and Emissions Reduction Action Plan*. Retrieved from City of Regina website: <https://www.regina.ca/export/sites/Regina.ca/about-regina/renewable-regina/.galleries/pdfs/Energy-Sustainability-Framework.pdf> (2022).
32. City of Calgary. *Calgary Climate Strategy: Pathways to 2050*. Retrieved from City of Calgary website: <https://www.calgary.ca/environment/climate.html> (2022).
33. City of Vancouver. *Climate Emergency Action Plan*. Retrieved from City of Vancouver website: <https://council.vancouver.ca/20201103/documents/p1.pdf> (2020).
34. City of Surrey. *Climate Change Action Strategy: Surrey's roadmap to a zero-carbon resilient city in 2050*. Retrieved from City of Surrey website: <https://www.surrey.ca/sites/default/files/media/documents/climate-change-action-strategy.pdf> (2023).
35. City of Toronto. *TransformTO Net Zero Strategy: A climate action pathway to 2030 and beyond*. Retrieved from City of Toronto website: <https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173758.pdf> (2021).
36. Amorim-Maia, A. T., Anguelovski, I., Chu, E. & Connolly, J. Intersectional climate justice: A conceptual pathway for bridging adaptation planning, transformative action, and social equity. *Urban Clim.* **41**, 101053 (2022).
37. McArdle, R. Intersectional climate urbanism: Towards the inclusion of marginalised voices. *Geoforum* **126**, 302–305 (2021).
38. City of Edmonton. *Edmonton's Community Energy Transition Strategy & Action Plan*. Retrieved from City of Edmonton website: <https://www.edmonton.ca/sites/default/files/public-files/assets/PDF/EnergyTransitionStrategy2021-04-20.pdf?cb=1705006467> (2021).
39. City of Ottawa. *Energy Evolution: Ottawa's Community Energy Transition Strategy – Final Report*. Retrieved from City of Ottawa website: https://documents.ottawa.ca/sites/documents/files/energy_evolution_strategy_en.pdf (2020).
40. City of Montreal. *Climate Plan 2020-2030*. Retrieved from City of Montreal website: https://portail-m4s.s3.montreal.ca/pdf/climate_plan_2020_2030_vdm.pdf (2020).
41. Bhalla, M. *Advancing Environmental Health Equity in Canada: Using an Intersectional, Anti-Colonial Environmental Justice Approach to Reform, Implement & Design Federal Environmental Policies*. [Manuscript in preparation] (2023).
42. Cornthassel, J., Chaw-win-is & T'lakwadzi. Indigenous Storytelling, Truth-telling, and Community Approaches to Reconciliation. *ESC: Engl. Stud. Can.* **35**, 137–159 (2009).
43. Guyadeen, D. & Henstra, D. Evaluating rural municipal climate change plans in Ontario, Canada. *J. Rural Stud.* **97**, 123–139 (2023).
44. Sirigotis, J., Angelo, H., MacFarlane, K. & Millard-Ball, A. Why Climate Planning Struggles with Equity. In *Justice in Climate Action Planning*. (eds Petersen, B. & Ducros, H. B.) 61–77 (Springer, Cham, 2022).
45. Lazarus-Munnick, N., Radatus-Smith, N. & Nguyen, T. *Equity Strategy for Municipal Climate Action Planning*. David Suzuki Foundation. <https://davidssuzuki.org/science-learning-centre-article/equity-strategy-for-municipal-climate-action-planning/> (2023).
46. Yue, H., Wei, Y., Yuan, H. & Li, H. Revitalizing urban industrial heritage: Enhancing public trust in government through smart city development and open big data analysis using artificial neural network (ANN) modeling. *Cities* **156**, 1–19 (2025).
47. Statistics Canada | Government of Canada. The Daily — Canada in 2041: A larger, more diverse population with greater differences between regions. <https://www150.statcan.gc.ca/n1/daily-quotidien/220908/dq220908a-eng.htm> (2022).

Acknowledgements

Land Recognition: This study was conducted through the University of Toronto, and we wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land. This study was supported through the University of Toronto's Climate Positive Energy Fellowship. In addition to the authors of this work, we wish to acknowledge contributions to this paper that were provided through an in-person workshop that supported the development of the study; Brittany Maguire, Fiona Miller, John Robinson, Kate Mulligan, Paty Romero-Lankao, Robert Soden, Scott Prudham, and Vera Benedetto.

Author contributions

N.R-S. contributed to conceptualisation, data curation, data analysis, writing of the main manuscript text, and production of figures and tables. I.H. and H.J. contributed to conceptualisation, data analysis, writing of the manuscript, and production of figures. G.M. and I.S. contributed to conceptualisation, reviewing and editing of the manuscript.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1038/s44168-025-00260-3>.

Correspondence and requests for materials should be addressed to Harshavardhan Jatkar.

Reprints and permissions information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2025