# Exclusionary Zoning and Environmental Racism in Vancouver

## Exploring potential links between today's disparities and historic urban plans

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## Disclaimer

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## Executive Summary

Environmental racism contributes to deepening health disparities in cities across the globe. Recent research has shown how past and present structural racism has shaped today's distribution of adverse environmental exposures in urban cities. Most evidence has originated in the US; however, it is likely that cities in Canada present a comparable problem. While Canada is increasingly recognizing the enduring and harmful consequences of colonization, there remains a limited understanding of how urban planning and interventions have influenced the distribution of historically marginalized communities in Canadian cities. Additionally, the potential role of this phenomenon in perpetuating environmental racism, whether through unintentional or deliberate exclusionary policies, remains understudied.

The purpose of this report is to provide a baseline that can be used in future efforts to deepen the City's understanding of specific outcomes of exclusionary policies that interact with present-day hazards and risks identified in the City's Hazard, Risk, and Vulnerability Assessment (HRVA). This report is an initial exploratory stage of the potential of risk mapping in assessing, informing and fostering conversations with communities to redress environmental racism in Vancouver. This objective was achieved by combining a literature review, and consulting experts on using data and community engagement to assess health disparities and environmental racism. In addition, this document reports on a preliminary spatial analysis of the current distribution of visible minorities, the risk of extreme heat exposure in Vancouver, and potential links with historic urban plans implemented in Vancouver.

This report documents a concerning overlap between high warm-season temperatures and the proportion of visible minorities in Vancouver. Two areas of particular concern are South Vancouver and the east and southeast parts of the city. Further analyses are required to assess the effect of these environmental exposures on population health outcomes. In line with the City of Vancouver's definition of equity, risk and vulnerability maps on environmental racism should both be seen as an assessment of equity outputs and a process. Approaching risk mapping as a process serves different purposes, such as providing a tool that fosters dialogues with communities, putting data at the service of residents and populations to use in their own community projects, and generating ideas for further analyses and interpretations. Moreover, a truly participatory process, where racialized communities share their interpretations, lived experiences, and concerns, not only strengthens the analysis and the relationships between the City and communities but can also constitute an act of reconciliation itself.

## Introduction

Racism is a major determinant of health that is deeply intertwined with other social structures and systems of exclusion (Williams & Mohammed, 2013). The global and country-level burden of disease is not equally distributed across different populations, leading to health disparities that disproportionately affect historically marginalized, equity-denied populations, and visible minorities. One of the major drivers of health inequity is caused by exposure to contaminants from multiple industrial and natural sources (Landrigan et al., 2018).

Although most deaths caused by pollution occur in middle and low-income countries, equity-denied communities in high-income countries are more exposed to contamination than their national counterparts (Basu & Lanphear, 2019; Landrigan et al., 2018). For example, in a study conducted across 23 countries, Anderson and colleagues (Anderson et al., 2016) found evidence of poorer health outcomes for Indigenous peoples compared to non-indigenous populations. These outcomes are likely influenced by toxic exposures due to the uneven distribution of pollution. This is the case in Canada, where Indigenous populations are threatened by chemical exposure, and many communities have drinking water advisories, low-quality dwellings, and live near polluted industrial areas (Basu & Lanphear, 2019; First Nation Health Authority, 2023; Government of Canada, 2023; Parkes, 2016; Wiebe, 2016).

The inequity in health outcomes experienced by equity-denied communities is a persistent issue in urban environments, including cities in high-income countries. Inspired by the environmental justice movement, there has been a growing concern to understand and solve health disparities driven by uneven cumulative exposures to environmental hazards and

chemical contamination in urban environments (Prochaska et al., 2014; Van Horne et al., 2022). Research on the interlink between the built environment and human health from an equity perspective has led to identifying widespread disparities in issues such as heat exposure (Alizadeh et al., 2022; Benz & Burney, 2021), low quality of urban parks (Rigolon et al., 2018), and exposure to air pollution (Castillo et al., 2021). In addition, the specific role of structural racism in driving health disparities and mediating access to urban spaces that foster well-being has also been assessed (Wilson, 2020).

Moreover, environmental racism is now a well-established subset of the environmental justice movement, defined as the policies and practices that disproportionately affect populations based on race (Bullard, 2001). Thus, environmental racism is intentional or unintentional racial discrimination in policymaking (Waldron, 2016). Research on urban environmental racism has been mainly conducted in the United States, analyzing the role of exclusionary housing policies and practices on health disparities. Some of these policies and practices include zoning ordinances and renovation interventions, but also currently illegal practices such as restrictive covenants, blockbusting, and steering (Henderson & Wells, 2021). The distribution of populations across neighbourhoods is a continuous process influenced by historical socioeconomic processes; thus, past policies can affect present health outcomes. For example, historical “redlining” in the US (i.e., 1930's maps to quantify real estate credit risk across the country) has been linked to several health outcomes in the present, including reduced life expectancy disproportionately affecting Black populations (Huang & Sehgal, 2022; Noelke et al., 2022). Although there has been emergent attention to assessing environmental

racism in the US, this country is not an isolated case, as the structural racism embedded in the colonization process still affects many other countries.

Although there is a growing awareness in Canada about the ongoing and devastating effects of colonization, there is limited understanding of how urban planning and interventions have shaped the distribution of historically marginalized populations in Canadian cities and the potential contribution of this process to perpetuate environmental racism through unintentional and intentional exclusionary policies. Vancouver is home to rich and diverse communities, yet many communities have faced, and continue to face, discrimination and exclusion. Recently, the City of Vancouver began working with equity-denied communities to identify and analyze the role of unjust and exclusionary policies and how they have shaped racial discrimination in the City today. In addition, the City's resilience, disaster risk reduction, and climate adaptation strategies are progressively collecting data and mapping risk in Vancouver (City of Vancouver, 2023). Preliminary examinations indicated that neighbourhoods with higher concentrations of racialized communities are disproportionately exposed to specific hazards and risks. Yet, data gaps remain around disproportionate impacts specifically to racialized communities, including, but not limited to, Indigenous populations, South Asian communities, and Black and African diaspora communities.

The purpose of this report is to provide a baseline and explore tools that can be used in future efforts to deepen the City's understanding of specific outcomes of exclusionary policies that interact with present-day hazards and risks identified in the City's Hazard, Risk, and

Vulnerability Assessment (HRVA) – including extreme heat. This will be achieved through the following objectives:

- To characterize data availability to map hazards included in the City's Hazard, Risk, and Vulnerability Assessment
- To identify areas of disproportionate exposure of visible minorities to heat, outlined as one the top 5 in the City's Hazard, Risk, and Vulnerability Assessment
- To explore the potential links between selected discriminatory policies in the current distribution of racialized communities and hazards in Vancouver
- To identify strategies and practices to include risk maps as knowledge sharing strategies with equity-denied populations

This report is an initial exploratory stage of the potential of risk mapping in assessing, informing and fostering conversations with communities to redress environmental racism in Vancouver. The purpose of this document is to provide a background for future studies and interventions analyzing the distribution of hazards and their overlap with the distribution of racialized populations in the City. This includes projects to identify the negative impacts of discriminatory policies and their effects on the unequal distribution of hazards. In addition, in-depth analyses of the community members' perceptions and lived experiences of discriminatory policies and the current distribution of populations and hazards can also be conducted.

To achieve the objectives of this report, I followed several strategies. First, I reviewed three sources of published information: 1) the City's documentation relevant to the topics of environmental justice and environmental racism, such as frameworks, reports, and plans; 2) scientific articles on urban environmental racism and exclusionary zoning, with an emphasis in Canada and the US; and 3) available data on potential hazards and population distribution. Second, I co-led a series of meetings with experts from several institutions in Metro Vancouver and Washington State to learn from their own processes of using data and community engagement to assess health disparities and environmental racism. Third, I conducted a preliminary analysis to explore the spatial overlap between the current distribution of visible minorities and the risk of extreme heat exposure in Vancouver. Finally, the information collected through these strategies was put in conversation with early plans of the city of Vancouver as an exercise to shed light on the potential pathways to assess environmental racism in future studies.

# Background

## Urban Environmental Racism in Canada

Empirical evidence of urban environmental racism in Canada is far lagging behind the numerous calls from environmental justice and other movements about the role of structural racism in disproportionally exposing racialized populations to health hazards. The effect of colonization on the well-being and the individual and collective health of Indigenous populations has been widely documented (Goodman et al., 2017; Greenwood et al., 2018;

Kolahdooz et al., 2017; Nelson & Wilson, 2017; Redvers et al., 2019; Tobe et al., 2015). However, there is far less attention on the effect of structural racism in influencing human health in urban environments and only a few published studies looking at a wider range of racialized populations, such as South and East Asian communities, and Black and African diaspora (Nettos, 2022).

The limited empirical evidence exploring environmental exposures from an equity lens in Canada is worrisome. Particularly despite the growing evidence in Canada of the health effects of factors that have been linked to environmental racism elsewhere. For example, two nationwide studies in Canada showed that exposure to greenspaces improves childhood development (Jarvis et al., 2021) and that the social and economic costs of heat-related health outcomes are exacerbated among disadvantaged groups (Clark et al., 2021). These two factors are closely interlinked with structural racism, thus requiring analyses that deepen our understanding of this particular factor.

The few studies on environmental racism in urban settings that have been conducted in Canada align with the findings in the US and the UK (Nettos, 2022). For example, Buzzeli and Jerret showed that there is an exposure disparity to air pollution in Hamilton, Ontario, where non-European immigrants are disproportionately affected (Buzzelli & Jerrett, 2004). However, the authors also highlighted that patterns of environmental racism seem to differ from those in the US, warranting further studies to understand the specific challenges faced in Canadian cities. Moreover, the quality of the urban environment is comprised of a complex and interconnected mix of factors that operate at multiple dimensions of human health and

wellbeing (Ren & Giang, 2022). Thus, the synergy and trade-offs between different urban environmental factors must be understood while accounting for differences across historically marginalized populations (Ren & Giang, 2022).

The relevance of urban environmental racism, the concerning knowledge gap, and the initial empirical evidence have yet to be reflected in broader attention by policymakers and researchers in Canada. Three potential reasons are 1) limited access to disaggregated data to link health outcomes with urban environmental exposures, 2) Canadian news media's limited coverage and downplay through discourse when reporting equity-denied communities exposed to pollution (Deacon et al., 2015), and 3) although some provinces and territories have "environmental bills of rights" and legal frameworks for addressing environmental rights, there are remaining gaps in areas related to federal jurisdiction (Waldron, 2018, 2020).

Despite these challenges, some advancements could strengthen strategies to assess and tackle environmental racism in Canada. Recent collaborations like The Canadian Urban Environmental Health Research Consortium (CANUE) and The Community Data Program are improving data accessibility in urban environmental health research. In addition, Statistics Canada announced the Disaggregated Data Action Plan to expand the information available on diverse human groups at various levels of geography. Moreover, in 2023, the National Strategy on Environmental Racism and Environmental Justice Act (Bill C-226) passed from the House of Commons to the Senate. If approved, it would provide a federal legal framework to face environmental racism in Canada.

In addition, a few Canadian cities have also implemented strategies to integrate equity frameworks in their programs, interventions, and plans. This is the case of Edmonton, where the city acknowledged its zoning bylaw often results in inequitable outcomes and adopted a structured methodology to implement an equity lens (Agrawal et al., 2023). This holistic methodology can be adapted to other cities in Canada. In addition, other initiatives have come from non-governmental organizations and projects looking to build bridges between equity-denied populations and communities. Such is the case of the ENRICH project, aiming to support efforts undertaken by African Nova Scotian and Mi'kmaw communities to address disproportionate pollution and contaminants in their communities (Waldron, 2016). The ENRICH project used Seattle's Equity and Environment Agenda as a framework to bring together communities, organizations, and government to create solutions to disproportionate pollution. As described in the Seattle's Office of Sustainability & Environment official webpage, the Equity & Environment Agenda was developed in deep partnership with the community and engaging over 1000 residents to guide the work of the City in Seattle's environmental programs and policies (Office of Sustainability & Environment, 2023). Indeed, Seattle was identified in a national scan as one of the 10 cities in the US using proactive planning as a tool to tackle environmental injustices (Baptista, 2019).

### Vancouver's path to redress environmental racism

The City of Vancouver has a long overdue responsibility of tackling environmental justice issues in the city and addressing challenges of environmental racism, including those

unintentionally perpetuated by policies and plans. Aligned with the vision outlined in the Healthy City Strategy, the City of Vancouver's efforts are directed towards building a city where collective action continuously enhances the circumstances that empower everyone to attain the utmost levels of health and well-being. Particularly, the Healthy City Strategy emphasizes that all people have the right to live in a healthy environment, with awareness of potentially harmful pollutants and contaminants. Moreover, the City's Equity Framework underscores that racism, as a significant aspect of colonization, creates disparities in power, thus limiting non-white populations' access to opportunities for economic, political, and social progression. In addition, as stated in the Resilient Vancouver Strategy, there is a need to "support ongoing community dialogue that fosters empathy and understanding across diverse groups, and enables us to talk about hard issues — ranging from racism to climate change… [and] hold space and amplify efforts to elevate the current and historical experiences of diverse people and groups in Vancouver" (City of Vancouver, 2019). This kind of dialogue is crucial to deepen the City's understanding of specific outcomes of exclusionary policies that interact with present-day hazards and risks identified in the City's Hazard, Risk, and Vulnerability Assessment (HRVA) – including extreme heat.

In addition to the City of Vancouver, other institutions like Metro Vancouver and Vancouver Coastal Health are aiming to advance our understanding of exposure to environmental hazards through an equity lens. Metro Vancouver recently advanced in assessing inequities in the region by developing and mapping social equity quantitative indicators to produce an Inequity Baseline to inform future regional growth and planning

(Metro Vancouver, 2021). Vancouver Coastal Health conceived a project to identify differences across communities in regard to their vulnerability to four climate change-related hazards, such as high summer temperatures and air pollution. These snapshots of the current disparities in risks and vulnerability to environmental hazards and social equity offer valuable insights to reflect on the effect of past policies in shaping the distribution of these factors and as tools to generate dialogues with equity-seeking communities. Current publicly available data may not be adequate to establish causal links between past policies and present health disparities in Vancouver. However, in the next section, I explore the potential connection between the current distribution of visible minorities and heat exposure risk and early zoning plans of the City. This hopes to spark a conversation that expands to other policies and plans, showing the need for further research, and collaborating in establishing an equity lens to assess previous, present, and future policies of Vancouver.

## Connecting today's disparities with the past: Bartholomew Plan through the environmental justice and environmental racism lenses

The distribution of racialized populations in Vancouver is not homogenous, leading to differential proportions across neighbourhoods of visible minorities, speakers of Canadian official languages, and ethnic diversity. This is evident when looking at the proportion of visible minorities across Dissemination Areas (DA) in Vancouver based on the 2021 Census (Figure 1).

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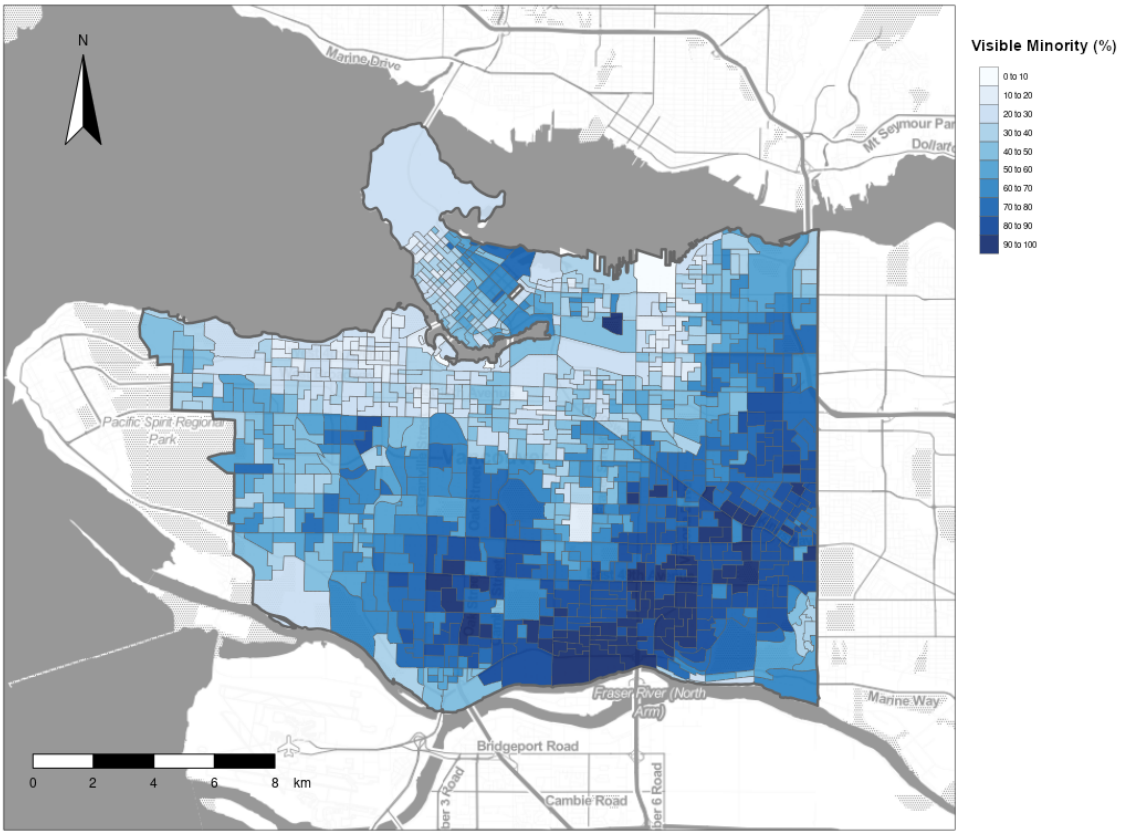


Figure 1. The proportion of visible minorities in Vancouver by Dissemination Area. Data: Census 2021

Some areas with the highest proportions of visible minorities are located in the south and southeast, with additional smaller areas in Downtown and to the east (Figure 1). In an effort to quantify social equity in the region, Metro Vancouver calculated the Shannon Ethnic Diversity Index. This index takes into account both the abundance and evenness of the populations and ranges between 0 and 1, with 1 representing higher levels of diversity (Metro Vancouver, 2021). The Shannon Index across DAs in Vancouver (Figure 2.) presents a similar pattern to the distribution of visible minorities in the city (Figure 1). However, there are some noticeable differences, such as DAs in Strathcona showing low ethnic diversity despite having some of the highest proportions of visible minorities in the city.

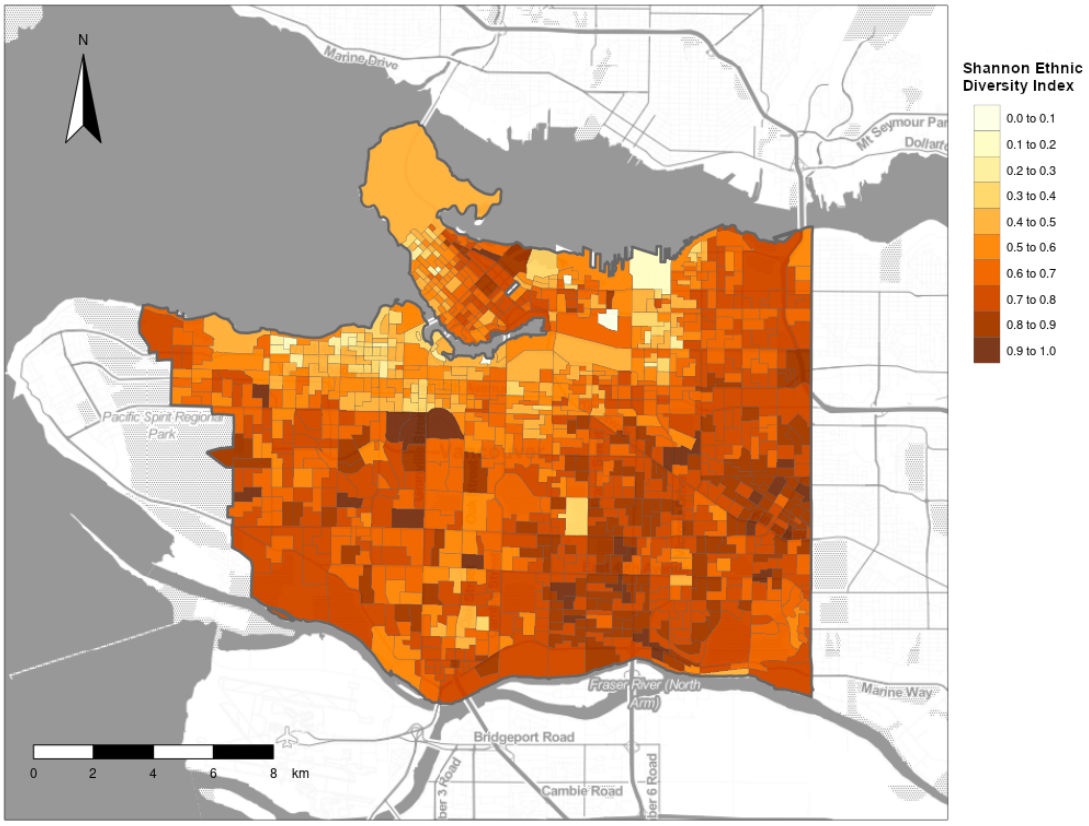


Figure 2. Shannon Ethnic Diversity Index across Dissemination Areas in Vancouver. The index ranges from 0 to 1, with high values representing higher diversity. Data source: Metro Vancouver

From an environmental justice perspective, it is crucial to assess if the quality of the environment and the potential hazards in the city are equitably distributed across populations. Exposure to extreme heat has been identified as a main concern under the HRVA, which aligns with the social, environmental, and economic impacts of these events in the region (White et al., 2023). The characteristics of the natural and built environment drive outdoor temperatures, leading to uneven distribution of heat in the city during extreme events (Figure 3).

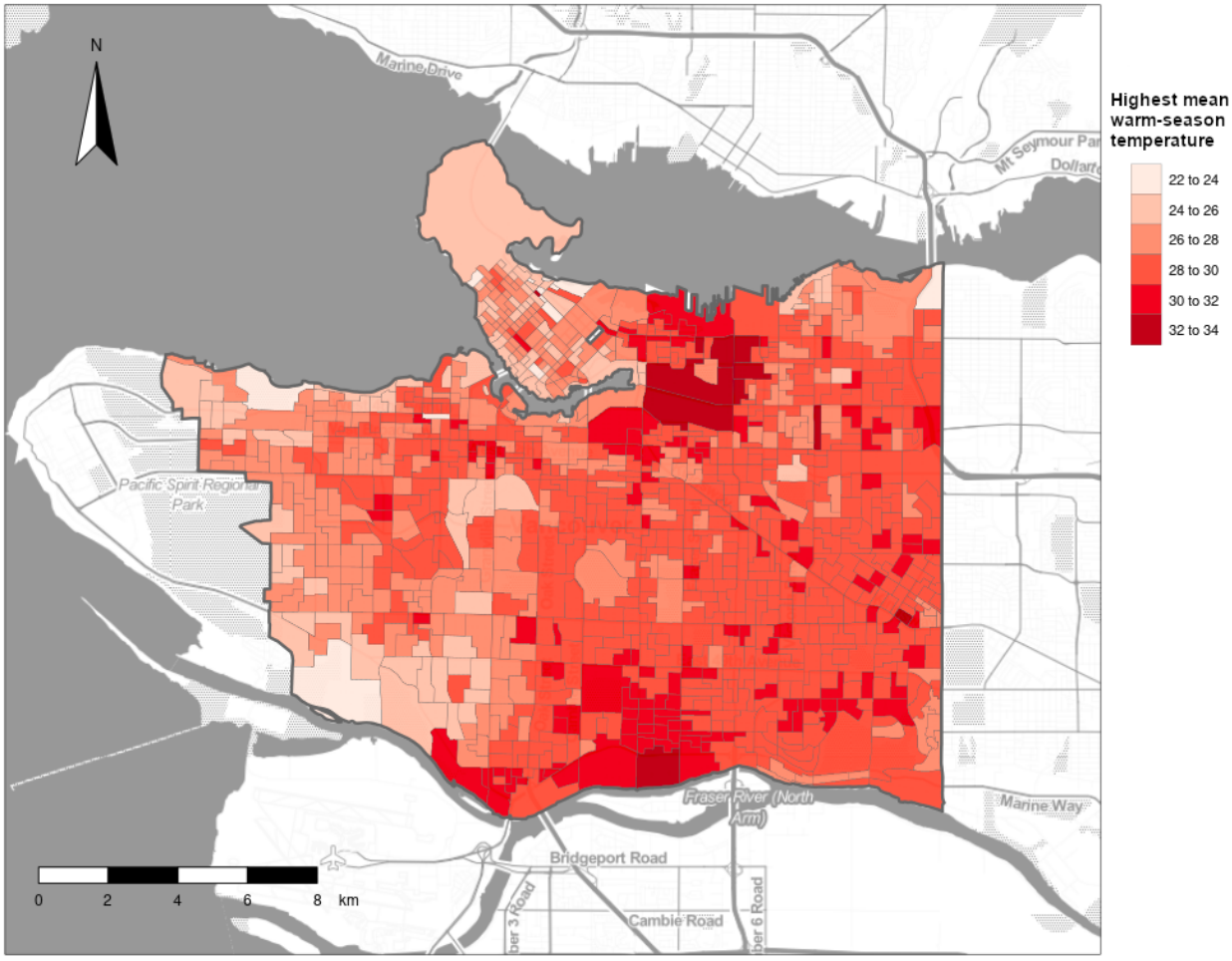


Figure 3. Distribution of the highest mean warm-season temperature in Vancouver between 2019-2021. Temperature in Celcius. Data sources: CANUE

The highest mean warm-season temperature registered in Vancouver between 2019 and 2021 was in Strathcona and South Vancouver. In addition, the pattern of maximum temperatures is relatively lower in most parts of the west side of the city, with the exemption of a few DAs (Figure 3). An additional step was to assess the overlap between the distribution of extreme heat and the proportion of visible minorities using a bivariate choropleth map that shows the variation of the two variables simultaneously (Figure 4).

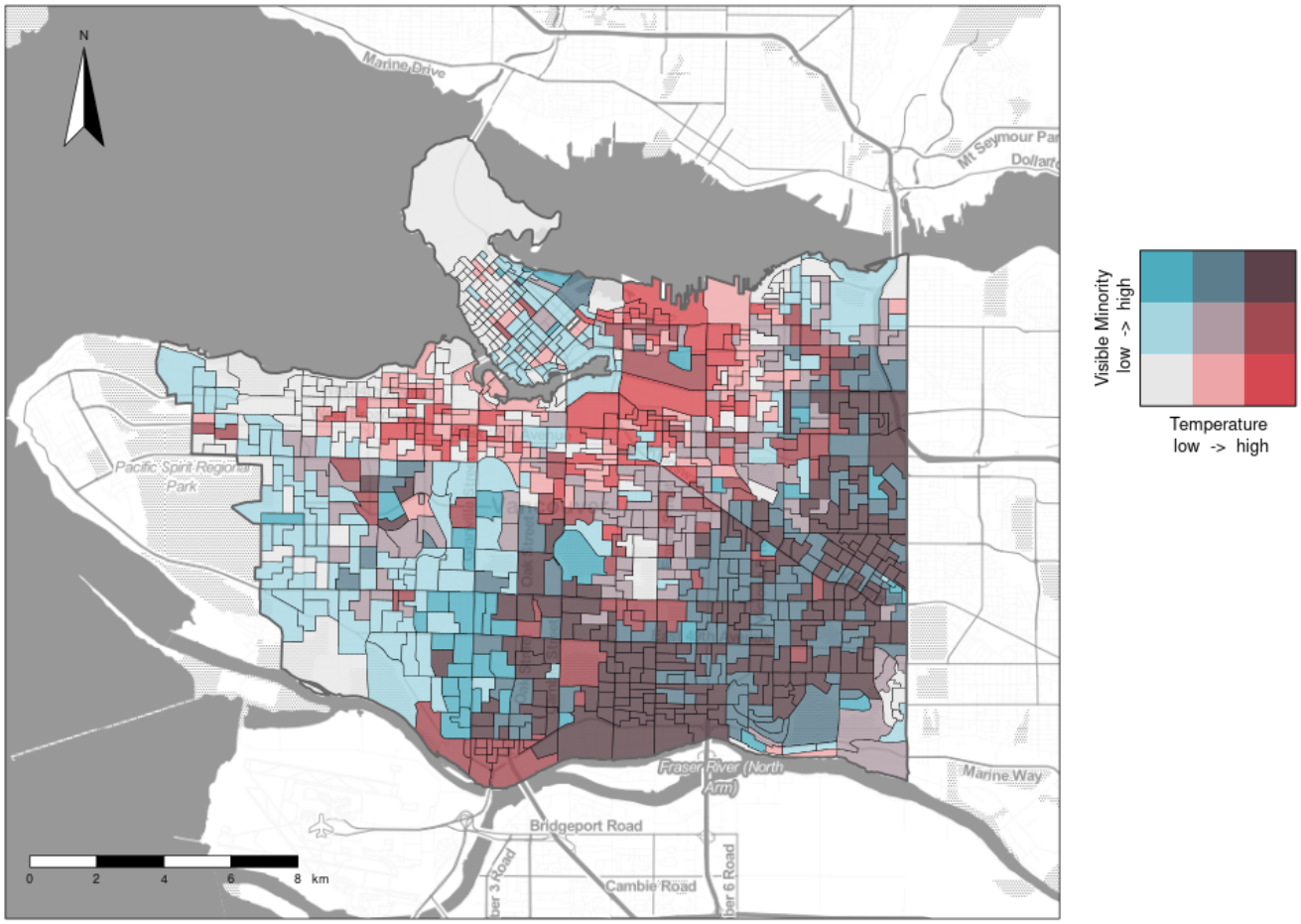


Figure 4. Bivariate map showing the agreement and disagreement in the highest mean warm-season temperature between 2019-2021 and the proportion of visible minorities in Vancouver. Light blue shows where both variables present low values, and dark brown when both present high values. Data sources: CANUE and 2021 Census.

The overlap between high warm-season temperatures and the proportion of visible minorities at the DA level is concerning. Although there are areas of disagreement, the bivariate map shows a similar pattern to the visible minority proportion distribution, providing evidence of the correlation between elevated risk heat exposure and where racialized communities live. Two areas of particular concern are South Vancouver and the east and southeast parts of the city. As health disparities are driven by cumulative and complex effects from multiple environmental adverse and positive environmental exposures (Ren & Giang, 2022), it is necessary to expand this analysis by including other environmental risks. Such is the case of the interaction between heat exposure and air pollution, which could further exacerbate the health disparities in Vancouver. This requires assessments and interventions that account for multiple natural and human-made environmental exposures, including those that originated outside the city's boundaries. For example, the location of industries with an active air quality permit (i.e., permitted polluters) in the northern part of Richmond could lead to cumulative exposures in South Vancouver (Figure 5).

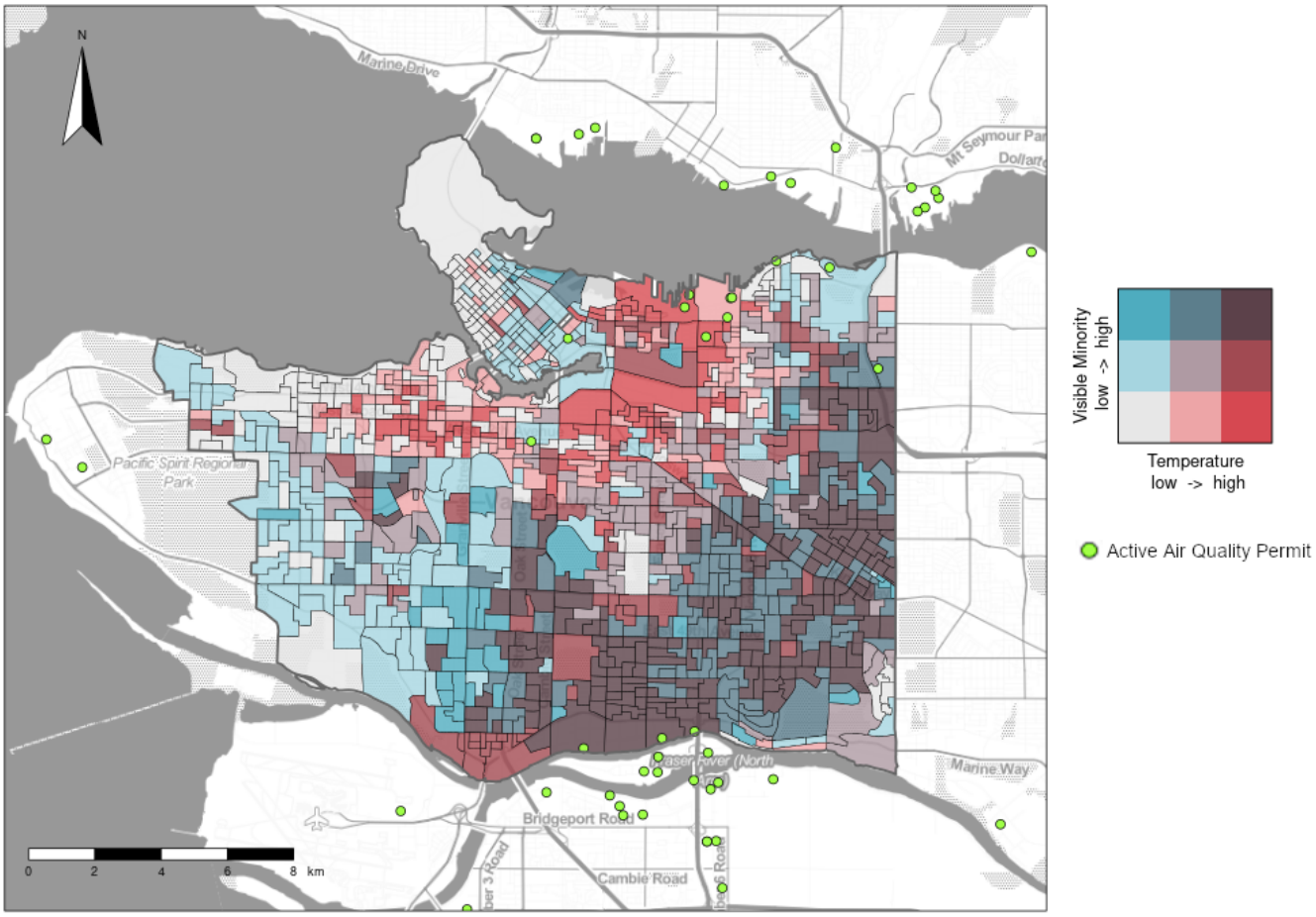


Figure 5. Bivariate map showing the agreement and disagreement in the highest mean warm-season temperature between 2019-2021 and the proportion of visible minorities in Vancouver. Light blue shows where both variables present low values, and dark brown when both present high values. Bright green dots show the location of industries with an active air quality permit. Data sources: CANUE, 2021 Census, and Vancouver Coastal Health.

It is out of the scope of this report to provide evidence of a causal link between prior policies and programs implemented by the City and today's disproportionate distribution of heat exposures among racialized communities. However, a preliminary analysis of past policies, plans, and practices and the current state of the city can shed light on potential areas of future research and promote further scans applying an equity lens. The first city-wide plan, known as

The Bartholomew Plan, was finalized in 1928 (Vancouver Town Planning Commission & Harland Bartholomew and Associates, 1928). The analysis of this document offers a relevant opportunity to trace the connection between early visions of the city and current disparities in exposure to environmental hazards. I chose this example as an alternative point to start tracing forward the historical policies, plans, and practices that have shaped the distribution of populations in Vancouver.

Far from only being a representation of the vision of Bartholomew's for Vancouver, the plan also reflects the values of the commercial elites and the Commission who hired him (Pettit, 1993). This is clear in several sections of the plan where the input of the Commission is made explicit, such as the following statement: "The retention of Vancouver as a city of single family homes has always been close to the heart of those engaged in the preparation of this plan". In addition, there are mentions of citizens' rejections of increasing the density in their zones, which may be indicative of shared values of the Commission with specific sectors of the population. Moreover, the fact that the Plan continued to influence decisions and projects in the city despite never being legislated shows how decision-makers shared Bartholomew's values and perspectives about Vancouver. For example, in the plan, the city and its surroundings are portrayed as spaces with "limitless resources" and the territory as a place for new projects that earlier inhabitants have already "abandoned".

Concerningly, Indigenous Peoples are mentioned for the first time on page 201 in the context of presenting Reserve lands as "wasted space" that should be put to the service of those living in the vicinity. The plan presents Vancouver as a young, forward-looking city without

history and surrounded by pristine wilderness. This vision still continues to be marketed and promoted by generations of politicians, real estate developers and other economic sectors, erasing the rich history of Indigenous peoples, immigrants and other currently racialized communities (Kenny, 2016).

One of the prevailing storylines of the document is the need to protect single-family housing from the harms of commercial, industrial and high-density areas. Without directly mentioning race, the document is centred around protecting a mode of living uncommon among immigrants and other racialized populations. Moreover, it establishes that elites consider other forms of living undesirable, as noted in the following text: “That the one-family dwelling is the desirable unity for happy living is the general consensus [sic] of opinion of all authorities”. In addition, commercial areas were seen as a threat to the quality of residential zones: “The scattering of stores promiscuously throughout residence districts has done considerable damage to the city’s appearance” Indeed, most of the city was reserved for single-family housing, with multiple-family housing serving as a buffer from commercial and industrial zones (Figure 6; Figure 7).

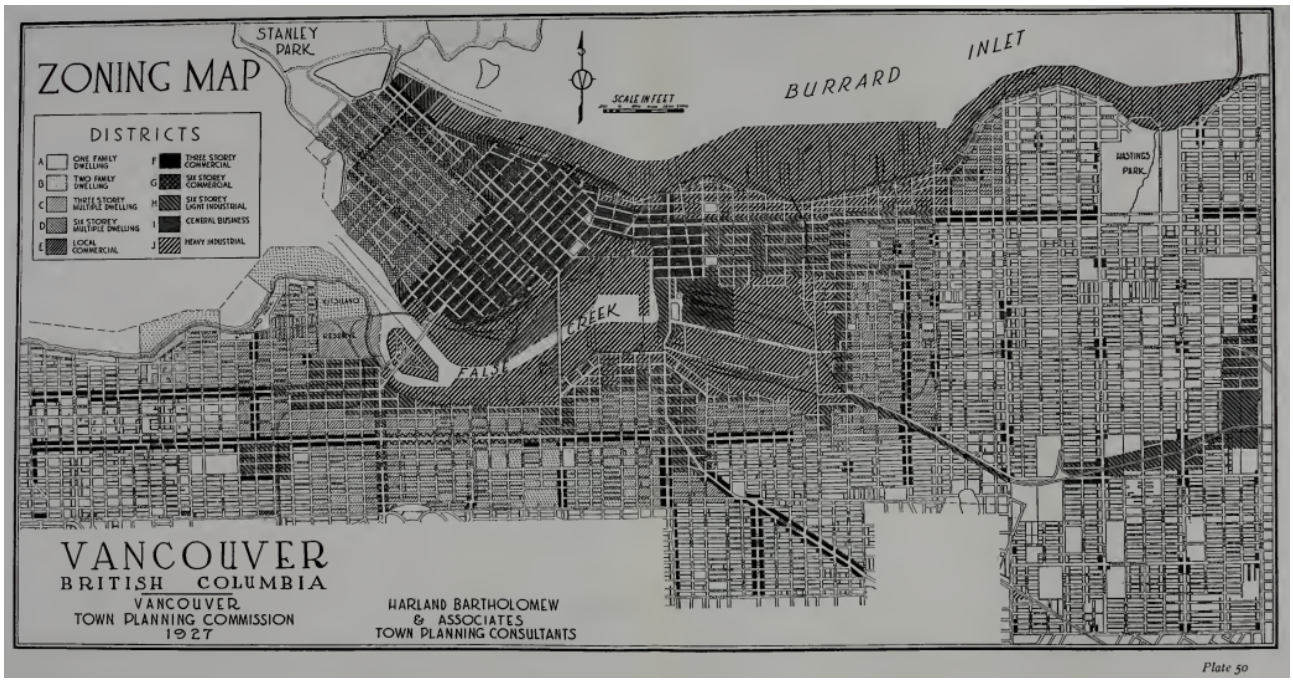


Figure 6. Map from the Bartholomew plan showing the Vancouver zoning by-law approved by the City Council and passed on December 17th, 1928 (Vancouver Town Planning Commission & Harland Bartholomew and Associates, 1928).

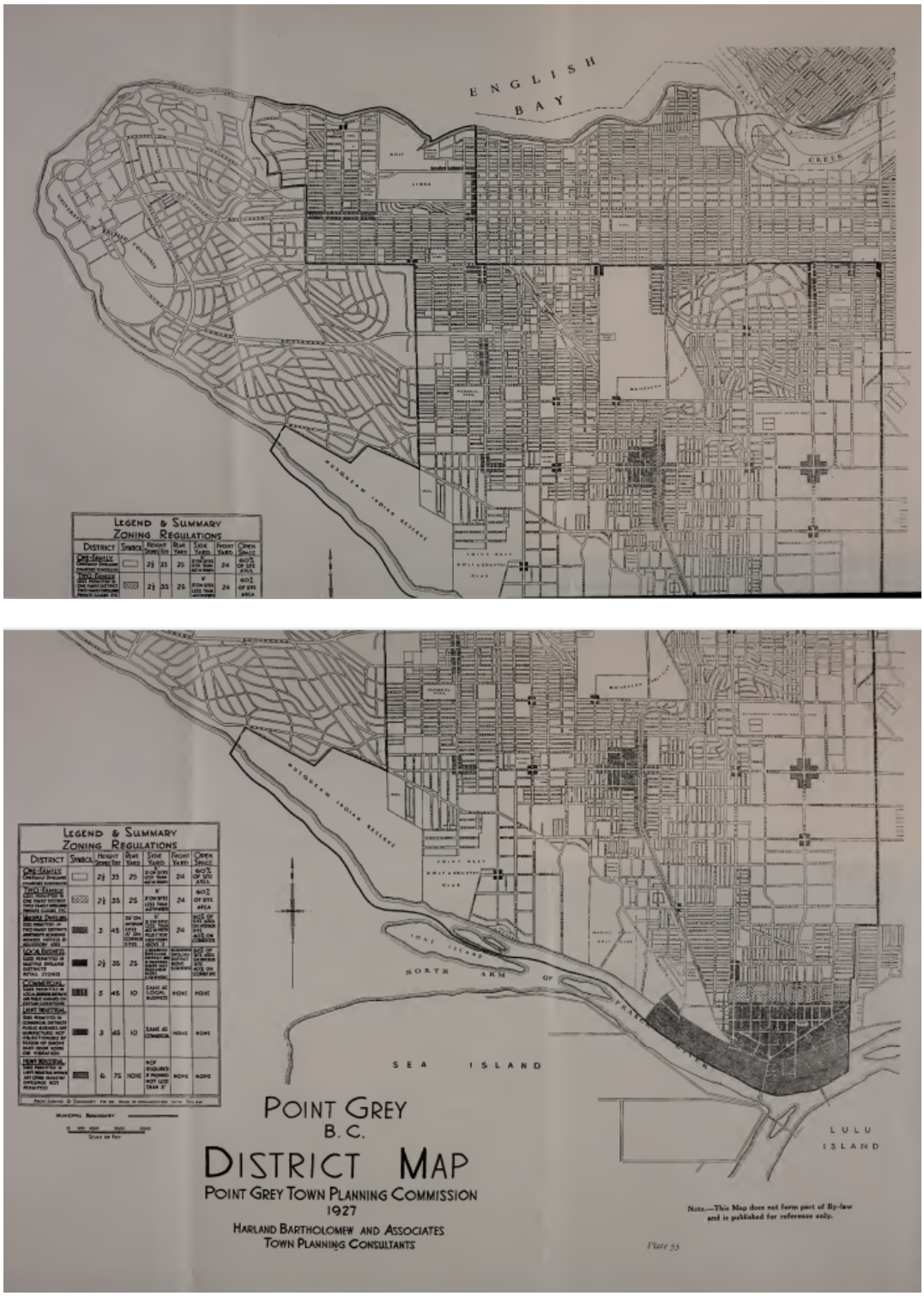


Figure 7. Map from the Bartholomew plan showing the Point Grey zoning by-law approved on October 24th, 1927 (Vancouver Town Planning Commission & Harland Bartholomew and Associates, 1928).

When visually comparing the original zoning plans with today's distribution of visible minorities in the city, there is a noticeable spatial overlap between areas designated for commercial and industrial purposes in 1928 and the current dwelling of racialized populations. This is particularly the case in South Vancouver, Strathcona, and areas between the neighbourhoods of Hasting-Sunrise and Renfrew-Collingwood. Conversely, areas that were zoned as single-family housing in 1928, and deemed as the ideal type of living, are currently characterized by low proportions of visible minorities and low levels of diversity (Figure 1; Figure 2).

The exploratory connection shown in the comparison of early zoning by-laws and the current distribution of racialized populations and environmental hazards offers a potential starting point for a more nuanced analysis of the connection of urban plans, policies, and practices in Vancouver. Beyond solely focusing on one specific past policy or plan, an overall scan from an equity perspective of the narratives, discourses, and assumptions underpinning decisions at the City level is warranted. This would require including additional hazards identified in the HRVA as well as including the beneficial components to the environment (e.g., parks) and additional characteristics of the population which may affect their vulnerability to adverse exposures. However, challenges remain around accessibility to disaggregated health-related data. This information is necessary to assess the differential exposures and outcomes across populations living in Canada and how they are linked to environmental hazards. Table 1 summarizes some of the data sources readily available to expand the exploratory research conducted in this report.

Table 1. Sources of data identified in this report

| | Data | Resolution /Geographic Unit | Type of variables | Access | Link |
|---|---|---|---|---|---|
| **Used in this report** | 2021 Canadian Census | Dissemination Area | Demographic information such as ethnicity, language, and variables related to socioeconomic status. | Statistics Canada<br><br>Public Access | Census Profile Downloads, 2021 (statcan.gc.ca) |
| | Social Equity Indicators | Dissemination Area | Social variables and indexes derived from public data sources | Public Access, download link upon request | Reports:<br><br>equity-regional-growth-management-study-phase-2-appendix-i-maps.pdf (metrovancouver.org)<br><br>Metro Vancouver Social Equity and Regional Growth - Equity Indicator Maps Update (2021 Census) |
| | Environmental Exposures | Postal code | Air quality, weather, Neighborhood characteristics, Greeness, Air quality, Weather | Multiple sources. Temperature data was derived from public satellite data.<br><br>Members of The Canadian Urban Environmental Health Research Consortium (canuedata.ca) | Welcome to CANUE - CANUE |

| | | | | | |
|---|---|---|---|---|---|
| **Additional Sources of Data identified** | Community characteristics and other variables | Multiple resolutions depending on the data source | Wide range of topics, including social, economic, cultural, and health-related | Multiple sources<br><br>https://communitydata.ca/about/consortia | https://communitydata.ca/data |
| | Health outcomes and determinants | Health Regions. There are 16 Health Regions in BC | Health-related | Statistics Canada<br><br>Public Access (Access to finner resolution data has to be requested)<br><br>Note: There are plans to expand access to disaggregated data: Disaggregated data action plan: Why it matters to you | Canadian Community Health Survey - Annual Component (CCHS) |

Although analyzing spatial quantitative variables and indicators is crucial to assess and redress environmental racism, a top-down approach isolated from the perspectives of communities facing environmental hazards can not lead to environmental justice by itself.

## Risk maps as tools to redress environmental racism and promote community engagement

Different strategies and documents of the City of Vancouver (e.g., Resilient Vancouver Strategy) highlight the crucial role of supporting community dialogue and amplifying local voices to elevate the experiences of people living in Vancouver. In addition, in the City's Equity Framework, equity is defined both as an outcome and a process:

> Equity as an outcome is dependent on equity as a process. It is impossible to move in the direction of an equitable society without the process of identifying and eliminating subtle and explicit forms of discrimination. How we do this matters. Generally speaking, equitable conditions cannot be arrived at through patronizing and colonial approaches where those in power, once again, assume their own superiority and attempt to impose their will on those who have been oppressed. Instead, equity as a process is participatory and seeks to integrate the views of those impacted by a decision, particularly those who have been underrepresented and underserved. It requires listening to and co-creation across differences in identity and power. It requires redistributing power across different groups (City of Vancouver, 2021).

In line with this definition of equity, risk and vulnerability maps on environmental racism in Vancouver should both be seen as an assessment of equity outputs and a process. The latter requires the establishment of horizontal partnerships with communities where the interpretation, assumptions, and variables are put in conversation with those directly affected by environmental racism. Approaching risk mapping as a process serves different purposes, such as providing a tool that fosters dialogues with communities, putting data at the service of residents and populations to

use in their own community projects, and generating ideas and hypotheses for further analyses and interpretations.

Existing maps to assess the distribution of exposures in Vancouver, such as the Climate Vulnerability Index (VCH) and the social equity indicators developed by Metro Vancouver, can be put in conversation with racialized communities. A truly participatory process, where racialized communities share their interpretations, lived experiences, and concerns, not only strengthens the analysis and the relationships between the City and communities but can also constitute an act of reconciliation itself. This type of participatory approach to environmental justice has been applied in contexts comparable to that of Vancouver, as is the case of Seattle.

In 2015, the City of Seattle launched the Equity & Environment Initiative (EEI). This partnership between the City and the community aims to strengthen and deepen the City's commitment to environmental justice, with an explicit emphasis on tackling environmental racism. The participatory process of the EEI is comprised of a shared Agenda, a Committee and a Fund looking to better connect community-based solutions to government processes (Office of Sustainability & Environment, 2023). In addition, data is used to track and inform solutions, and it is readily available online for communities to overlay variables, including health-related, demographics, drivers of vulnerability and environmental exposures (City of Seattle, 2023; Washington State Department of Health, 2023). Moreover, the data is provided by the City to equip communities in their process of applying for grants. Although the urban environmental

justice and environmental racism research in Canada, British Columbia, and Vancouver are lagging behind, there is growing institutional interest, emerging partnerships with communities, and rich research tools and data that need to be put to the service of environmental justice and racial and social equity.

## Conclusion

The City of Vancouver has recently begun working with equity-denied communities to identify and analyze the role of unjust and exclusionary policies and how they have shaped racial discrimination in the City. This long overdue goal can be supported by spatial data sciences that use risk mapping to assess health disparities across the city. However, risk and vulnerability maps on environmental racism should both be seen as an input in the assessment of equity outputs and a process to strengthen relationships and participation of communities. The exploratory results presented in this report shed light on the need for further analyses to assess and address concerning patterns of environmental exposures that may be associated with health disparities in the city. However, national and international experiences highlight the need to foster an environment where communities interact with health and population data, which can serve as a tool for advancing environmental justice.

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