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Pursuit of environmental justice in urban forest planning and practice

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Introduction: There is a growing demand for urban forest management that prioritizes genuine community involvement, acknowledges power imbalances within society, and embraces the principles of environmental justice. To assess current initiatives and share better/best approaches, examining how environmental justice principles are applied in urban forest planning and practice is crucial. This study aims to understand the perspectives of urban foresters on the factors that either facilitate or impede the attainment of environmental justice goals.

Methods: Interviews were conducted with urban foresters from non-profit organizations and municipal government in San Francisco, California, and Seattle, Washington. The interviewees were asked to identify and discuss their tree planting and maintenance strategies, public engagement protocol, and inter-organizational collaboration processes. To provide a contextual understanding of environmental injustice in the study cities, the historical racist practice of neighborhood redlining was examined alongside current tree canopy cover, locations of environmental hazards, and the spatial distribution of persons of color and those living in poverty.

Results: The findings revealed that urban forestry professionals in each city approached environmental justice in distinct yet complementary ways: San Francisco prioritized distributional justice, while Seattle focused on elements of procedural and recognitional justice. The Race and Social Justice Initiative in Seattle and Proposition E in San Francisco have been instrumental in identifying and addressing inequities in urban forest planning and practice.

Discussion/conclusion: Creating fair and inclusive urban forestry practices that prioritize disadvantaged neighborhoods has been a difficult task for both cities. Acknowledging and addressing past policies and cultural perspectives that have led to marginalization is crucial for building trust with these communities. Moving forward, prioritizing recognitional justice in urban forest planning and management should be a top priority.

KEYWORDS

environmental justice, urban forest, redlining, distributional justice, procedural justice, recognitional justice, San Francisco, Seattle

Introduction

Urban trees have ecological and social significance to the neighborhoods where they grow. Yet, not all communities have the same access to high-quality green spaces, with lower-income and racialized areas often having less tree cover (Gerrish and Watkins, 2018; Watkins and Gerrish, 2018). This lack of access to urban forests is considered an issue of environmental justice by scholars and activists (Schwarz et al., 2015; Nesbitt et al., 2019b; Riley and Gardiner, 2020). Understanding how power dynamics affect urban

forest management and community engagement practices is essential (Watkins et al., 2017; Carmichael and McDonough, 2018, 2019; Nesbitt et al., 2019a). To delve deeper into this issue, we interviewed urban foresters, which included arborists, environmental justice advocates, urban planners, policy analysts, and ecologists involved in urban forest decision-making and planning, in San Francisco, California and Seattle, Washington. Through these interviews we sought to determine if and how these urban foresters incorporate environmental justice goals into their urban forest planning and practices. Their insights shed light on the factors enabling or limiting their ability to achieve environmental justice in their work.

It is predicted that cities will be more severely impacted by the negative effects of global climate change (Friel et al., 2011). Urban forests, which include green infrastructure such as urban parks, street trees, and natural areas, have become even more valued due to their positive impacts on air quality (Nowak et al., 2018), flood mitigation (Berland et al., 2017), temperature moderation (Greene and Millward, 2017), and psychological wellbeing (Chiesura, 2004; De Vries et al., 2013; Jiang et al., 2016). These benefits are essential in minimizing impacts on human health and reducing the frequency of environmental hazards (Turner-Skoff and Cavender, 2019). With this in mind, many cities and urban centers in the United States aim to expand their green infrastructure by increasing tree plantings and protecting existing urban forest cover (Derkzen et al., 2017; Norton et al., 2018).

To ensure the value of urban trees are identified and maintained in the long term, many US and Canadian municipalities have created Urban Forest Management Plans (UFMPs). These plans outline a vision for tree maintenance and canopy expansion through stewardship goals and pathways for implementation and monitoring (Ordóñez and Duinker, 2013; Gibbons and Ryan, 2015). UFMPs are tailored to the local context and are authored by qualified city staff, non-profit partners, and third-party arboriculture consultants (Miller et al., 2015; Kowalski and Conway, 2019). The goals of UFMPs typically focus on ecologically-grounded actions like planting native trees, conducting tree inventories, managing pests and diseases, and increasing tree canopy coverage (Ordóñez and Duinker, 2013). More recently published plans include strategies for strengthening public engagement (e.g., via volunteer tree-planting/stewardship events) and improving public awareness concerning the benefits of urban trees (Gibbons and Ryan, 2015).

The fulfillment of UFMP tree-planting and maintenance goals is regularly handled by various municipal departments, non-profit organizations, and community volunteers (Pincetl et al., 2013; Carmichael and McDonough, 2018). Partnerships between municipalities, non-profits, and volunteers are common regarding activities like street tree plantings, tree inventories, and front and backyard tree giveaways (Eisenman et al., 2021). Examining issues related to access and implementation of urban greening goals can be achieved by applying an environmental justice framework to urban planning, particularly regarding urban forests. This framework comprises three pillars: distributional, procedural, and recognitional justice.

The uneven investment by municipalities in tree-planting and maintenance practices can be considered a distributional injustice (Schlosberg, 2007; Rigolon and Németh, 2021). Ensuring members of the public have access to accurate information and resources (e.g., regarding the benefits/burdens of trees, tree care, and maintenance responsibilities, location/time of tree-planting and stewardship events) and that public engagement campaigns and broader decision-making processes are fair, accessible, and transparent are measures of procedural justice (Nesbitt et al., 2018; Verheij and Corrêa Nunes, 2021). Inclusion and prioritization of varying perspectives, experiences, preferences, values, and knowledge of disadvantaged (e.g., racialized, low-income) and neglected groups (i.e., those living in low-canopy neighborhoods, those historically left out of decision-making) in urban forest planning and the delivery of tree-planting and stewardship events are essential to recognitional justice (Campbell et al., 2022; Grant et al., 2022).

To embrace environmental justice, especially recognitional, urban forest practitioners must consider historical, cultural, and institutional factors that could influence the perspectives, values, experiences, preferences, and knowledge of disadvantaged and neglected groups regarding urban trees (Grant et al., 2022). UFMPs that were recently published tend to include strategies for addressing distributional injustices, such as planting trees in lower canopy neighborhoods, and promoting procedural justice by strengthening community engagement and outreach processes (Grant et al., 2022). However, these plans rarely include strategies for improving recognitional justice, and when they do, it is usually brief and lacks explanation. The unequal distribution of trees across city neighborhoods (Greene et al., 2018) has been highlighted by scholars and activists as an underlying inequity resulting from the procedural and recognitional injustices of urban forest management and planning (Carmichael and McDonough, 2019; Nesbitt et al., 2019a). Carmichael and McDonough (2018) found that in Detroit, residents were excluded from decision-making processes surrounding tree species selection and maintenance responsibilities, resulting in community resistance to urban tree planting.

Studying different authoring stakeholders' impact on environmental justice goals in UFMPs is a crucial research area. It involves analyzing how planning documents, management, and decision-making practices address or perpetuate environmental injustices (Dorries et al., 2019). Focusing on community-based efforts and implementing environmental justice goals through programs and processes (e.g., tree giveaways and community planting events) is also important. Grant et al. (2022) studied the role of UFMPs and associated urban forest initiatives in addressing environmental injustices related to urban forests. However, they found little discussion on the views of urban forest practitioners regarding opportunities and barriers to promoting equitable tree cover in US cities.

This research has three objectives. First, it aims to understand how environmental justice is perceived by UFMP authors and influencers in two cities. Second, it seeks to document the factors that are taken into consideration by municipal staff and non-governmental entities while planting and maintaining trees in their respective cities. Third, it explores the extent of public participation in urban forest planning and programming, as well as the municipality's collaborative efforts with other organizations

to achieve their goals of promoting tree-planting and community engagement. San Francisco and Seattle are important case study cities to explore given their different yet complementary structural policy changes and city-wide governance frameworks that focus on addressing social and distributional inequities. Our study pays special attention to these policy changes and governance frameworks and how they can potentially minimize distributional, procedural, and recognitional injustices in future urban forest planning and management. While the practice of urban forestry includes managing trees on public and private property (e.g., public parks, streets, private yards, natural areas), our study focused mainly on street tree management because of the specific street tree-planting programs and maintenance policies in each of the cities.

Methods

Study locations

The study sites comprise cities with a significant history of organizing and activism related to environmental and racial justice concerns (O'Neill and VanDeveer, 2005; McKendry and Janos, 2015; Dillon and Sze, 2016; Ngo, 2022), and as a result, various municipal departments, policies, and non-profit organizations have been established to address longstanding environmental injustices facing neglected and oppressed communities (Pearsall and Pierce, 2010; City of San Francisco Commission on the Environment, 2018; City of Seattle, 2023a). While both cities have progressive-leaning political histories, their demographic profiles vary according to population density, racial composition, education, and household income (U.S. Census Bureau, 2021) (Table 1). Moreover, they have distinct differences in their current urban forest composition and distribution, a product of biophysical variability and a legacy of past urban planning practices (Nowak et al., 2007; Nowak and Greenfield, 2012; Locke et al., 2021).

San Francisco, California

San Francisco was constructed in an area naturally devoid of forests and dominated by rocks and sandy soil. As a result, most of the trees present in the city have been planted by humans (San Francisco Planning, 2023). San Francisco's tree canopy coverage is significantly lower than other major US cities, with an average of only 13.7% (San Francisco Planning, 2023). To expand and protect its street tree population, San Francisco developed a UFMP that was published in 2014 (City of San Francisco, 2014). The City of San Francisco entrusts the planning and management of its urban forest to various municipal departments, namely Recreation and Parks, Planning, Public Works, and Environment. Members from these departments are listed as authors on the city's UFMP. The municipality also partners with various agencies and non-profits, such as the San Francisco Urban Forestry Council and Friends of the Urban Forest (FUF), to advance urban tree planting and maintenance objectives (City of San Francisco, 2014). Within its UFMP, San Francisco acknowledges the uneven distribution of trees and maintenance practices across its neighborhoods and provides supporting maps that illustrate this inequity (City of San Francisco, 2014).

The Hunters Point Naval Shipyard Superfund Site is located in the city's southeast corner. A combined shipyard and Naval Radiological Defense Laboratory closing in 1974 and 1960, respectively, this location's soil, sediments, surface water, and groundwater are contaminated with petroleum, pesticides, heavy metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs) and radionuclides (United States Environmental Protection Agency, 2023a).

Proposition E for distributional justice in San Francisco

Prior to July 2017, the management of street trees in San Francisco was inconsistent and fragmented. Before this date, the upkeep of around 90% of San Francisco's street trees and the sidewalks around them fell under the responsibility of the adjacent property owners (SPUR, 2023). If the street trees and sidewalks were not well maintained, property owners could be held liable for any personal injuries or damages caused (SPUR, 2023). The City of San Francisco acknowledged the shortcomings of this management approach and proposed a solution in its 2014 UFMP. The proposed solution was to create a comprehensive, fully-funded street tree maintenance program and transfer the responsibility of street tree maintenance and sidewalk repair from property owners back to the City (City of San Francisco, 2014).

As a result of this recommendation, the City of San Francisco put forth a Charter amendment concerning street trees and sidewalks, known as Proposition E, to centralize the responsibility and liability of all street trees under the Department of Public Works (San Francisco Public Works, 2017). Proposition E was approved in November 2016, garnering 79% of the vote. This new policy and funding stream became effective on the 1st of July 2017, as stated by San Francisco Public Works (2017). Following the success of Proposition E, the City now allocates 19 million USD annually from the General Fund to cover tree-related maintenance costs. Proposition E aimed to tackle maintenance inequities while improving and expanding San Francisco's urban forest.

Seattle, Washington

Seattle was built in a naturally forested area that underwent decades of extensive logging and clear-cutting (Green Seattle Partnership, 2023). Its current tree canopy cover is 28.1% and has been in decline since 2016 (City of Seattle, 2023b). To understand and maintain its urban forest, Seattle developed its first UFMP in 2013 (see City of Seattle, 2013). The management of urban forests in Seattle is the responsibility of various municipal departments: Planning and Development, Sustainability and Environment, Seattle City Light, Transportation, Parks and Recreation, and Public Utilities. Like San Francisco, these department members collaborated as co-authors on the City's UFMP. The City has also partnered with non-governmental organizations such as Trees for Seattle to achieve its tree-planting and stewardship objectives (City of Seattle, 2023c). Seattle released an updated UFMP in 2020,

TABLE 1 2021 demographic data for San Francisco, California, and Seattle, Washington, with comparator data for all of the US (U.S. Census Bureau, 2021).

City	Population	Population density (persons/sq mile)	Persons of Color (%)	White persons (%)	Post-secondary education (%)	Annual household income (median $)
San Francisco	808,437	18,629	48.9	39.2	59.5	126,187
Seattle	749,256	8,792	32.6	62.2	65.9	105,391
United States	333,287,557	93.8	24.2	59.3	33.7	69,021

which is noteworthy for its emphasis on identifying and remedying environmental injustices affecting the city's urban forest, a subject suggested for exploration in the 2013 edition (see City of Seattle, 2013, 2020). Additionally, in a study by Grant et al. (2022), Seattle's 2020 UFMP was found to identify and explain distributional, procedural, and recognitional justice goals more than any other analyzed UFMP from the US.

Four Superfund sites are located close to Seattle neighborhoods. Three sites, Harbor Island, Lockheed West, and Pacific Sound Resources are located on the south shore of Elliot Bay in Seattle's industrial port area (United States Environmental Protection Agency, 2023b). Toxins at these sites include lead, petroleum, and creosote, which have contaminated the soil, groundwater, and near-shore sediments (United States Environmental Protection Agency, 2023b). Neighborhoods in south Seattle are proximate to the Lower Duwamish Waterway (LDW) site, which includes several miles of soil and sediment contamination resulting from a century of heavy industry; the LDW is connected to the Harbor Island site (United States Environmental Protection Agency, 2023b).

Race and social justice initiative for procedural and recognitional justice in Seattle

In 2004, Seattle implemented the Race and Social Justice Initiative (RSJI), the first municipally-led effort in the US to commit to ending institutionalized racism and achieving racial equity (City of Seattle, 2023d). The RSJI provides a framework for City departments to prioritize community engagement that acknowledges and challenges power imbalances, develop accountable relationships with the community, and confront structures and processes to achieve racially-just outcomes (City of Seattle, 2023d). Through racial equity training that involves critical self-reflection, the RSJI helps City officials and staff understand the intersections of racial equity and social justice to foster a more inclusive and responsive approach to urban governance (City of Seattle, 2023d). The RSJI serves as a model for other US municipalities, demonstrating the importance of actively challenging structural and institutional racism and advancing racial justice in all aspects of city planning, including urban forest management (City of Seattle, 2023d).

Data collection and analysis

During Fall of 2018, we engaged 28 individuals who were vital in influencing, designing, or implementing their city's UFMP and broader urban tree-planting initiatives. Fifteen individuals participated in individual semi-structured key-informant interviews ($n = 7$ in San Francisco, $n = 8$ in Seattle). Based on the preferences expressed by the interviewees, thirteen participants contributed to a group interview in each case study city ($n = 3$ in San Francisco, $n = 10$ in Seattle). We used purposive and snowball sampling (Palinkas et al., 2015) to select participants familiar with the localized and contextual nature of urban forest management in their city and contributed to the development and delivery of their city's UFMP and associated tree-planting initiatives. We recruited participants until saturation (Salkind, 2017). Our participants included members of various government departments (e.g., Parks and Forestry, Planning and Development, Public Utilities, Transportation, Environment), non-governmental organizations (e.g., tree-planting and care, environmental justice), former municipal politicians, and government researchers and scientists.

The individual and group interviews were identical in structure, delivery, and organization. All interviews conducted for this study were extensive, lasting between 60 to 90 mins. They were recorded and transcribed verbatim. The main points covered in these interviews included how participants define and measure environmental justice, their capacity to make decisions that support environmental justice goals (e.g., knowledge, staff, resources, political will), public consultation and engagement strategies used (e.g., levels of awareness regarding implications for in/exclusion of various identities, perspectives, and experiences), and how they collaborated with other stakeholders and organizations. Participation in the study was voluntary, and no incentives were given. Before the interview, written consent was obtained from each participant. The authors' host institution ethics board approved the study in January 2018.

The transcripts of the interviews were analyzed thematically with the use of NVivo 12 (QSR International Pty Ltd., 2018). We derived meaning units and codes deductively from theories and concepts of environmental justice and inductively by allowing new codes to emerge from the interview data (Hajer and Versteeg, 2005; Erlingsson and Brysiewicz, 2017). To ensure the accuracy of the analysis and coding scheme and to strengthen its credibility and dependability, two coders engaged in an iterative coding process (Steacy et al., 2016; Church et al., 2019). Each researcher coded the dataset separately, then met to discuss their interpretations of the identified themes. Disagreements were resolved through discussions until a consensus was reached.

To provide a historical context for the importance of environmental justice in present-day urban forestry, the legacy of neighborhood disinvestment in the form of redlining was investigated for its association with current manifestations of

distributional environmental (in)justice. This examination also permitted assessment of the levels of awareness interviewees held concerning environmental justice in the city neighborhoods whose urban forests they have responsibility. Redlining was a historical, racist, and discriminatory practice implemented by the federal government's Home Owners' Loan Corporation (HOLC). Between 1935 and 1940, the HOLC assigned grades to delimited residential neighborhoods using color-coded maps in hundreds of US cities based on race, ethnicity, religion, class, quality of housing, proximity to industry, and recent sale and rent value history (Appel and Nickerson, 2016). Appraisers and other real estate professionals considered the presence of racialized groups, low-income households, and immigrants to be unfavorable to a neighborhood's assessment; more than 5 million appraisals were conducted in 239 US cities (Hillier, 2005; Aaronson et al., 2021). Grades were assigned on a scale of A to D; class A areas were colored green and were considered "best"; class B areas were colored blue and were considered "still desirable"; class C areas were colored yellow and were considered "declining"; and class D areas were colored red and were considered "hazardous" (Nelson and Ayers, 2023).

Using a geographic information system (GIS), we overlayed the HOLC residential security map classifications of A through D with US census block boundaries containing (i) the percentage of residents living in poverty, (ii) the percent of persons of color, and (iii) tree canopy cover (Table 2) (U.S. Census Bureau, 2018; EarthDefine, 2021; Nelson and Ayers, 2023). Some of the geographic boundaries of census block groups differed from those of the historical HOLC security map classifications. Where this misalignment occurred, we associated block groups with a HOLC security map classification when greater than 50 percent of the block group area included a unique security map classification. In this paper, the percent of persons of color refers to the total population of a census block minus the population of white alone, non-Hispanic or Latino (i.e., individuals who responded "no, not Spanish/Hispanic/Latino" and who reported "white" as their only entry in the race category question in the US Census) (U.S. Census Bureau, 2018).

Results

Through interviews with urban foresters from San Francisco and Seattle, it was discovered that environmental justice was a key consideration in urban forest management and planning. In San Francisco, many urban forest professionals recognized the presence of distributional inequities in street tree planting and maintenance. On the other hand, in Seattle, urban foresters placed greater emphasis on strengthening procedural and recognitional justice. Both cities heavily relied on policy and governance documents to address environmental injustices in tree planting and maintenance. San Francisco's Proposition E centralized the responsibility and liability of street trees under the Department of Public Works, allowing urban foresters to focus on addressing distributional inequities in street tree maintenance. Meanwhile, Seattle's RSJI provided municipal urban foresters and their partners with the tools to acknowledge past racist planning policies and practices, self-reflect on public outreach practices and volunteer programming, and practice community-centered/led engagement for future urban forest management planning.

San Francisco

Conceptualizations of environmental justice

During the interviews, many participants showed a keen interest in tackling the issues of distributional inequalities in street tree canopy coverage. However, they also highlighted the challenges of infrastructure conflicts and inadequate space for planting new trees in some areas. A representative from Friends of the Urban Forest informed us of this:

> *"There is much infrastructure that prevents trees from existing in many urban areas, so until things change in some neighborhoods, there may not be equitable tree planting locations. But, if all things are equal and everyone's got a curbside, then there's no reason why every neighborhood shouldn't have a street tree right in front of every home—especially now that the City is caring for trees and pruning them into perpetuity".*

Study participants acknowledged the significance of Proposition E's passage in enhancing street tree coverage in neighborhoods with low canopy density. Furthermore, they agreed that this would greatly help address the disparities in maintenance procedures. However, the interviewees expressed varying opinions when tackling procedural and recognitional injustices and specifically promoting equitable decision-making in managing urban forests. A planner in San Francisco's Planning Department, who has the urban forest as part of their portfolio, emphasized the need to:

> *"Work with community members to find out what they want in their community. Some communities may desire more or less trees than others, so we want to respect their interests and work with them while we also try to meet citywide greening goals".*

However, a staff representative from Friends of the Urban Forest claimed that:

> *"We [Friends of the Urban Forest] are the resident experts on arboriculture in the city, and it is our responsibility to find out what the best management practices are in the United States and bring those to our city and educate our residents about the value of those practices. So, regarding addressing equity issues, I see it as top down".*

It is worth noting that during interviews, participants from San Francisco who favored a top-down approach to tackling environmental justice concerns predominantly held positions in non-profit organizations. On the other hand, those who favored a community-based approach were mainly involved in city planning and policy development.

Several study participants discussed racial equity's importance in addressing recognitional inequities in urban forest management. Some City departments have begun to deliver staff training about

TABLE 2 Median and interquartile range (IQR) for percent of persons living in poverty, percent of persons of color, and percent tree canopy cover for each of home owner's and loan corporation (HOLC) classifications A through D in San Francisco and Seattle (U.S. Census Bureau, 2018; EarthDefine, 2021; Nelson and Ayers, 2023).

City/HOLC class	Persons living in poverty (%) median (IQR)	Persons of color (%) median (IQR)	Tree canopy cover (%) median (IQR)
San Francisco			
A	4.0 (1.4 to 10.5)	41.7 (25.7 to 57.6)	14.0 (8.8 to 20.0)
B	15.0 (9.2 to 22.3)	63.9 (51.7 to 72.0)	5.0 (4.0 to 8.0)
C	15.6 (8.5 to 23.80	44.9 (29.7 to 72.1)	7.5 (5.0 to 13.0)
D	20.1 (13.2 to 30.5)	56.3 (36.8 to 83.0)	9.0 (6.0 to 13.0)
Seattle			
A	7.6 (4.1 to 12.1)	18.9 (11.3 to 26.2)	32.8 (28.1 to 36.0)
B	13.5 (7.9 to 21.4)	22.5 (16.7 to 28.4)	24.0 (18.5 to 29.5)
C	20.6 (13.1 to 30.9)	34.3 (22.4 to 69.7)	22.9 (17.5 to 27.4)
D	28.9 (21.2 to 37.2)	53.6 (36.7 to 68.6)	22.4 (18.4 to 26.9)

racial equity. A member of SF Environment commented that while these staff trainings are starting to take place,

> *"Talking about racial equity is uncomfortable for some people, and so part of what [they] are trying to do is normalize these conversations. City staff have participated in trainings organized by the Government Alliance on Race and Equity. But there are still people [City staff] with that mindset that [their] job is to take care of the environment and not focus on the people, but we are missing that connection with people".*

Factors considered when planting and maintaining trees

Study participants shared insights on various abiotic, social, and cultural factors when planting and maintaining trees in San Francisco. The built environment, including wire and utility conflicts, sidewalk width, and building heights, was identified as a significant factor that affects the selection of tree species and planting locations. Additionally, cultural preferences within communities may influence land use planning that involves trees. For example, some residents may prefer smaller shrubs or other vegetation instead of large trees. Moreover, some interviewees highlighted that some residents may have a fear or lack of interest in trees.

Several interviewees acknowledged the need to plant more trees in neighborhoods with low tree canopy cover. Other participants pointed out how Proposition E may lead urban foresters to prioritize street tree maintenance in communities with fewer trees; these areas also tend to have higher poverty rates (Figure 1). A staff member with SF Environment noted that:

> *"Since the City has taken over [street tree] maintenance again, their focus is going to be in areas of need, which are, historically, poorer neighborhoods".*

However, a few study participants noted that some communities expressed hesitation or opposition toward tree planting in low-canopy neighborhoods due to concerns of gentrification. An employee from the Bureau of Urban Forestry at Public Works provided an example of such concerns:

> *"When we [the City] target an area [for planting], we try to talk to people about why we're planting and make sure that people see it as a positive thing. We have had concerns raised while planting; for instance, people asking us, why are you coming to do this? This is going to result in gentrification, and people are going to get pushed out. So, we're really trying to make sure that people see that they have a right to have trees and that not having them is an environmental justice issue. We want them to see that we do not want to gentrify and push people out... So, much outreach will be important as we move into some of those communities".*

Although some study participants acknowledged that trees might be seen as a sign of gentrification and cause concern among residents, none of the interviewees mentioned the impact of historical redlining on the distribution of urban trees, community trust in city planning, or its connection to gentrification.

Public engagement in urban forest management and decision-making

During interviews in San Francisco, the topic of outreach strategies was discussed by many. Those involved in tree-planting programs shared that they heavily relied on volunteer labor to raise awareness about different tree programs. Volunteers were responsible for knocking on doors, distributing informative flyers, and partnering with community members to lead outreach efforts in specific neighborhoods. City employees emphasized the significance of keeping municipal websites updated with accurate information on urban trees. Non-profit organizations have hired multilingual staff to better engage with Spanish and Cantonese-speaking residents. According to interviewees, public meetings that focus on urban forest management and planning lack diversity in terms of demographic and neighborhood representation.

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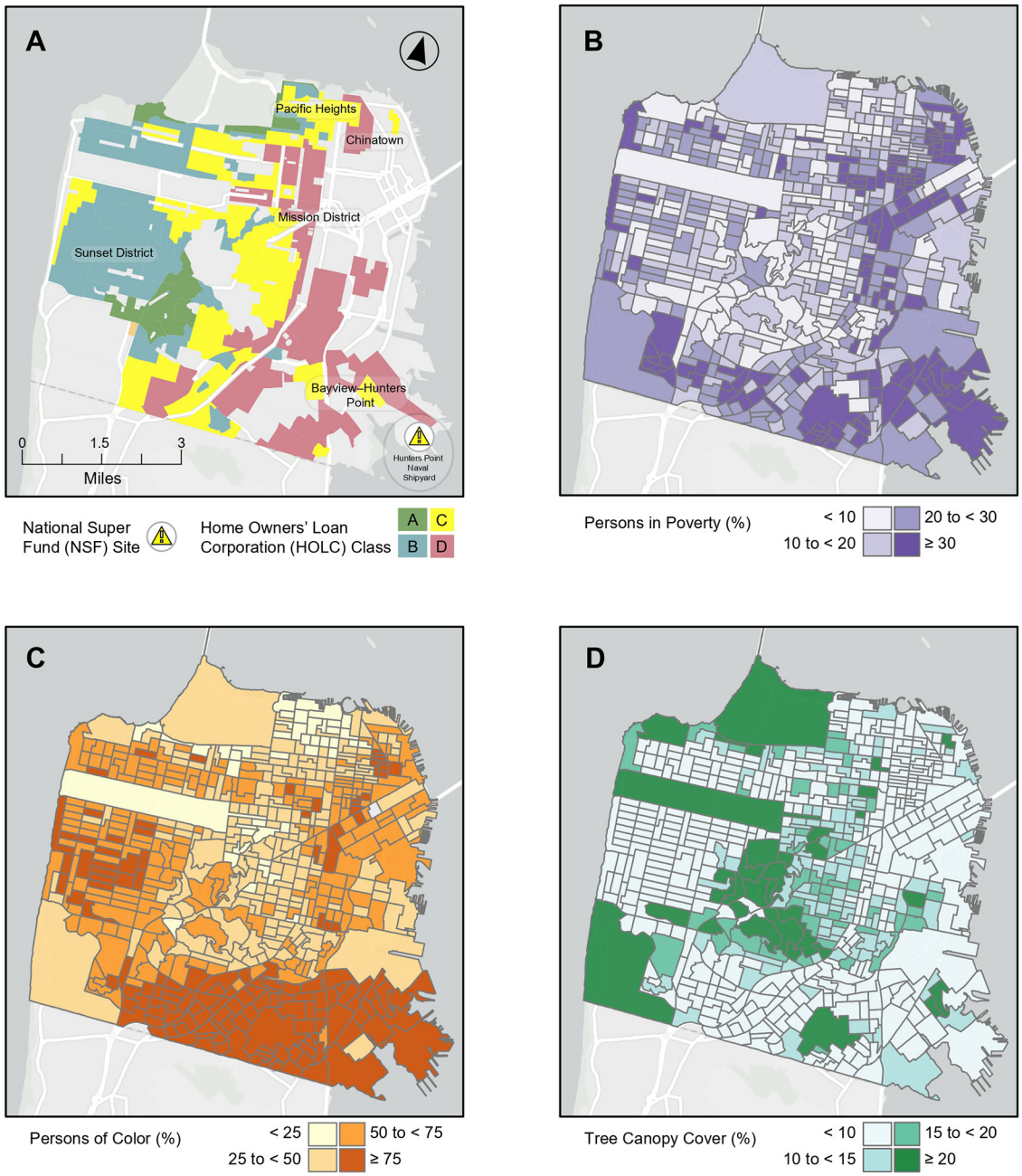

FIGURE 1
San Francisco, California maps of **(A)** Historical HOLC neighborhood classification and present-day census blocks with distribution of percent, **(B)** persons in poverty, **(C)** persons of color (all people who are not white, non-Hispanic), and **(D)** tree canopy cover (U.S. Census Bureau, 2018; EarthDefine, 2021; Nelson and Ayers, 2023).

Observations indicate that the attendees are mostly older, white, and affluent residents. It was also noted that these meetings do not accurately reflect the diversity of the entire city or specific neighborhoods.

Some interviewees acknowledged ways to improve engagement in urban forest management and decision-making. For instance, one study participant noted how some meetings could be held in low-canopy neighborhoods facing environmental justice issues to reduce commute times and encourage participation. An employee from SF Environment stated:

> *"City Hall is accessible to most of San Francisco, but it is not accessible from Bayview-Hunters Point. You can take the train, but it's a long trip. We should have some Urban Forestry Council meetings there to help achieve our goal of ensuring everyone is included in the conversation".*

A different staff member from SF Environment noted the importance of shifting power dynamics in community meetings. They stated:

> *"We need to move toward power-sharing, not just what we call the D.A.D. Model: Decide, Announce, Defend. In other words, we should not just invite people to be part of that decision-making without leaving space for them to contribute their ideas".*

Despite these ideas for improving engagement, some interviewees also acknowledged shortcomings in municipal funding, particularly for engagement/outreach positions focused on communicating and understanding the needs of disadvantaged and neglected groups. A Friends of the Urban Forest staff member commented:

> *"The City wasn't willing to fund the outreach coordinator position because [they believe] it has nothing to do with tree planting, but it has everything to do with tree planting… I think that without that position, and without that position growing, we will be challenged to achieve more equitable planting".*

While some urban foresters may hesitate to allocate funds for community outreach positions related to the urban forest, the urban foresters we interviewed in San Francisco recognized the vital role such work plays, particularly in building trust in areas with limited tree coverage. A representative from the Bureau of Urban Forestry confirmed this sentiment:

> *"In some communities, there's a real mistrust of government because of San Francisco's history with these redevelopment areas where people were pushed out of their homes. Building trust will be an important but challenging element of getting buy-in from communities that need it [trees] most. We need to make sure that it [tree-planting] doesn't feel imposed from the outside or that it is some big strategy to make them leave their community. I don't know the best way to do it—other than outreach. It is also going to take time... we are going to have to prove ourselves".*

Redlining and distributional justice

For San Francisco, a Kruskal-Wallis test indicated a significant difference in the percentage of persons in poverty among HOLC map classifications, $\chi 2(3) = 43.55$, $p < 0.001$. A post-hoc Mann Whitney U test indicated that the proportion of persons in poverty, according to HOLC map classifications, were significantly different, where A < B, A < C, A < D, B < D, and C < D ($p < 0.01$). Current residents of San Francisco living in locations that received a HOLC map classification D ("hazardous") are five times more likely to be living in poverty than residents of areas classified as A ("best"). The present proportion of persons of color differed significantly among the HOLC map classifications, $\chi 2(3) = 25.41$, $p < 0.001$. A post-hoc analysis identified a significant difference in the proportion of persons of color according to HOLC map classification, where A < B, A < D, B > C, and B > D ($p < 0.01$). Proportionately, 1.5 and 1.3 times more persons of color live in HOLC map classifications B ("still desirable") and D, respectively, compared with classification A. Tree canopy cover is significantly different among HOLC map classifications, $\chi 2(3) = 40.61$, $p < 0.001$. A significant difference in percent canopy cover among HOLC map classes was found using a post-hoc analysis, where A > B, A > C, A > D, B < C, and B < D ($p < 0.01$). Residents living in A classified locations have almost three times as much tree canopy as those residing in B classified areas.

Seattle

Conceptualizations of environmental justice

Interviewees were asked whether and how they address distributional, procedural, and recognitional inequities in their professional urban forestry roles. Concerning distributional justice, most study participants noted the significance of identifying and prioritizing neighborhoods with low tree canopy cover for targeted urban forest outreach. Some interviewees highlighted the importance of considering specific socio-demographic variables (e.g., income, race) and proximity of environmental harms when identifying where to plant new trees. For instance, a staff member with the non-profit organization Got Green stated:

> *"The places that are the most polluted and the most environmentally destroyed need to be prioritized for trees. We need to consider all the cumulative factors of what makes a community at high risk of pollutants—things like proximity to highways and pollution from planes. We also need to map where the poorest communities are, as well as other health factors like high rates of asthma".*

During interviews with urban foresters in Seattle, many emphasized the significance of rectifying distributional inequities related to tree canopy cover. They also highlighted how promoting procedural and recognitional justice could help address these inequities. Additionally, some participants emphasized the importance of personal and institutional reflection to improve their practices addressing environmental injustices related to urban forests. An analyst at Seattle Public Utilities emphasized this approach:

> *"We need to be listening to as many voices as possible, but more importantly amplifying and elevating voices that have been historically unheard and hurt by decisions of the past. We need to give them more airtime than what they would have experienced in the past. But it's also about the staff. It's about how we listen, how much time we spend listening to historically unheard people, and how we consider their input. As staff, we need to think about how we devote our time and energy to achieve equity".*

Most study participants identified the role of Seattle's RSJI as influential on their professional practice and personal interest in addressing environmental injustices, namely procedural and recognitional injustices. A representative of Seattle Public Utilities provided a concise summary of the situation:

> *"The Race and Social Justice Initiative made me start to think about my gaze. For example, I ask myself: Where is my gaze? How much time am I giving certain communities versus others? There are a lot of North end projects with a lot of energy*

> *around them, which is great, but at the same time, I know we need to shift attention, energy, and resources to the South end too".*

Factors considered when planting and maintaining trees

Urban foresters in Seattle highlighted various socio-ecological factors to consider while planting and nurturing trees in cities. These factors include residents' preferences, cultural norms, soil type, and microclimate. However, the lack of available space in some neighborhoods was identified as a significant hurdle in expanding tree cover. To overcome this challenge, the study participants emphasized the need for collaboration with other City government departments to achieve their city-wide tree-planting targets. An employee associated with Trees for Seattle, a tree-planting initiative linked with Seattle Public Utilities, affirmed the importance of such collaboration:

> *"It's really difficult to plant trees in some of these neighborhoods because of historical planning. The infrastructure of some industrial areas makes it so there is no appropriate place to put trees. So, does the Urban Forestry Team focus on tree planting in underserved areas? Yes. Are those areas being planted equitably in comparison to other neighborhoods? No, because so much of them are paved over or dedicated to other land use types. So, if you want an equitable forest, it will take a lot more than the Urban Forestry Team—we will also need to involve the Mayor's Office".*

In Seattle, property owners have the responsibility of maintaining street trees and are liable for any damage caused to the sidewalk or personal injury resulting from trees growing near public infrastructure. When asked how residents of neighborhoods with low canopy cover are encouraged to plant trees, a seasoned volunteer of Seattle's Urban Forestry Commission mentioned that they have a specific approach:

> *"Tree-planting is based on getting an agreement from the adjacent property owner. Getting agreement from the South end or from property owners that are lower income is more challenging. The City wants to plant all their trees down there [in the South end], but they still tend to plant trees in other areas of the city because they can't get the agreements for trees in lower-income areas. They [the City] are doing the best they can. Is it equitable? No. But you can't force trees".*

During the interviews, participants discussed how past racist planning practices like redlining had affected the presence of trees in urban areas that are lower-income and racialized. Figure 2 illustrates historically redlined neighborhoods; and, the distribution of trees, proportion of persons of color, and persons in poverty, according to census block. Some participants observed that several previously redlined areas are undergoing redevelopment, including the expansion of parks and tree planting, leading to gentrification and the displacement of long-time residents. An employee from Got Green shared their perspective on this matter:

> *"Unfortunately, because of the way our city is set up, and because of redlining, communities of color and low-income communities are often placed in areas with the least trees, the most polluted, and the least environmentally sustainable. There's strong racist history in our country and our city. South Park is a poor neighborhood surrounded by industrial and polluting facilities. Why would you put all these landfills and polluting industries next to a poor community? Who made this decision? It goes back to City planning. And now we're seeing that people who have historically lived in these neighborhoods are being pushed out because they can't afford to live there anymore. These neighborhoods that were undesired in the past are now gentrifying. So, while we support the need for more parks and trees, as well as light rail and green energy in these communities, we also want to ensure that lower-income folks, immigrants, and people of color benefit from them".*

Public engagement in urban forest management and decision-making

Many interviewees described outreach and community engagement around tree planting and maintenance in Seattle as including strategies such as tabling at community events, door knocking, distributing informative flyers, postering libraries, and businesses, mailing residents postcards about tree-planting events, and offering neighborhood-based tree care workshops. Generally, study participants emphasized targeting outreach efforts in Seattle's low-canopy neighborhoods. As an example, an employee with the program Trees for Seattle stated:

> *"Our program is open citywide, anyone in Seattle can apply, but we do target our outreach in areas of the city that are underserved and have a lower canopy. In those areas, we attend neighborhood festivals, leave flyers on the streets, and go door-to-door. And we do see results from our efforts—there are more applications from where we target our outreach".*

Several study participants expressed dissatisfaction with some of the outreach strategies they had previously employed. A policy advisor from the Office of Sustainability and Environment analyzed Seattle's 2013 Urban Forest Management Plan and shared their insights:

> *"We wanted to hear from the community, but in many instances, we showed up believing that they needed this, and they needed that, without really engaging them. There were no listening sessions, no sharing spaces, or anything of that sort. It was mostly white, affluent communities that were engaged because they had the time. Low-income, high-diversity communities—we didn't really meet with them. We used the Racial Equity Toolkit [from the Race and Social Justice Initiative], which is meant to be applied to specific policies or plans to understand the unintended consequences of our actions better, and we applied it to the outreach we did for our 2013 plan and realized that we had done outreach, not engagement. And so, we are working on doing things differently this time around. Our idea now is to work with communities of color, lower-income*

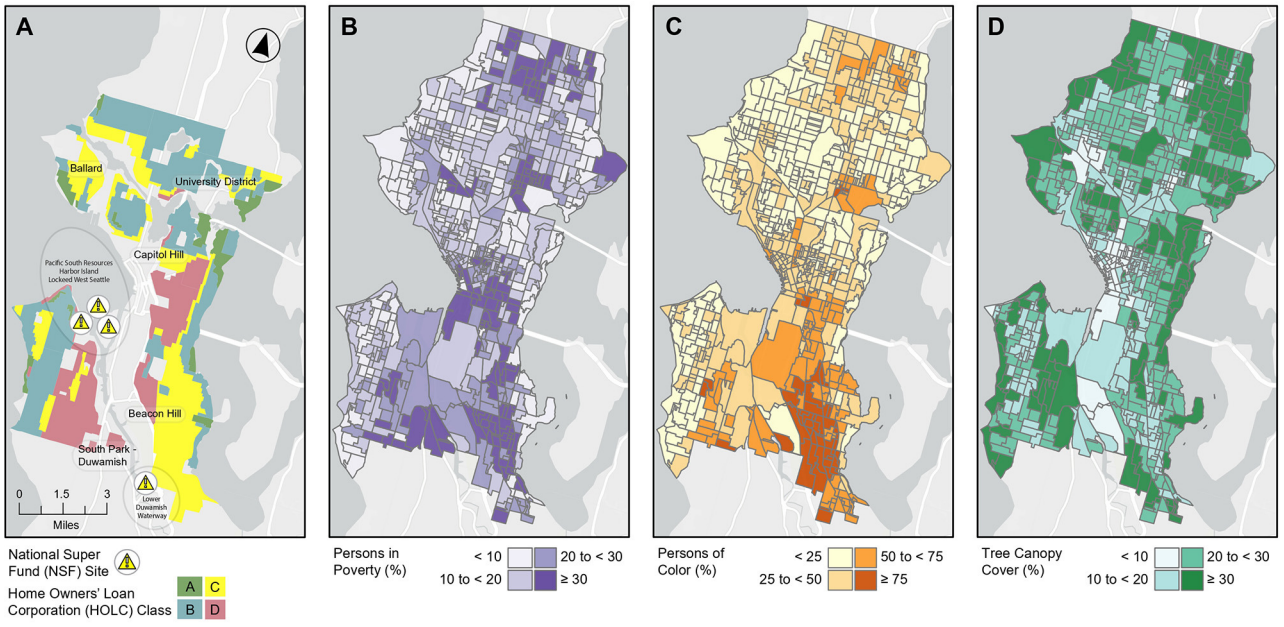

FIGURE 2
Seattle, Washington maps of **(A)** historical HOLC neighborhood classification and present-day census blocks with distribution of percent, **(B)** persons in poverty, **(C)** persons of color (all people who are not white non-Hispanic), and **(D)** tree canopy cover (U.S. Census Bureau, 2018; EarthDefine, 2021; Nelson and Ayers, 2023).

> *groups, and all the people that are not normally at the table and work with them to develop goals for the urban forest that are meaningful to them".*

Like San Francisco, Seattle depends on volunteer work to achieve its tree-planting and stewardship objectives. The Green Seattle Partnership (GSP) is a cooperative effort among multiple municipal departments, including Seattle Parks, the Office of Sustainability and Environment, and Public Utilities, as well as Forterra, that heavily relies on volunteer assistance. A policy advisor from Seattle's Office of Sustainability and Environment emphasized the significant role volunteers play in the GSP:

> *"Over 800,000 volunteer hours have been donated to remove invasive species, plant native understory plants and seedlings, and regenerate the forest".*

While a staff member of Forterra responsible for overseeing the GSP and volunteer programming added:

> *"Our volunteers tend to be a lot of retired, pretty highly educated white men. We have also seen a lot of younger people coming out, especially in the traditionally underserved communities where there is a lot of gentrification—like in Southeast Seattle. Younger people are now moving into these neighborhoods and wanting to get involved, and the Green Seattle Partnership is a way for them to do that. We are still not getting very many forest stewards of color out to our events".*

Furthermore, when asked to reflect on whether volunteers were working on specific tree-planting initiatives within their own neighborhoods, several study participants noted a disconnect—especially in low-canopy areas. An employee with Seattle City Light stated:

> *"We have not had overwhelming support from the actual folks living in lower-canopy neighborhoods. Out of a group of twenty, maybe three or four are from the neighborhood. So, we have a lot of volunteers, but they are not usually from the neighborhood we are planting in. The ideal would be to have these communities come to us and say: "Hey! We'd like some trees!" But I don't know the reality of an underserved community. I know there are a lot of different languages being spoken, and so maybe this [trees] is something they don't know they can ask for".*

Redlining and distributional justice

For Seattle, a Kruskal-Wallis test indicated a significant difference in the percentage of persons in poverty among HOLC map classifications, $\chi 2(3) = 104.84$, $p < 0.001$. A post-hoc Mann Whitney U test indicated that the proportion of persons in poverty, according to HOLC map classifications, were significantly different, where A < B, A < C, A < D, B < C, B < D, and C < D ($p < 0.01$). Current residents of Seattle living in locations that received a HOLC map classification D are 3.6 times more likely to live in poverty than residents of areas classified as A. The present proportion of persons of color differed significantly among the HOLC map classifications, $\chi 2(3) = 158.78$, $p < 0.001$. A post-hoc analysis identified a significant difference in the proportion of persons of color according to HOLC map classification, where A < C, A < D,

B < C, B < D, and C < D ($p < 0.01$). Proportionately, three times more persons of color live in HOLC map classification D compared with classification A. Tree canopy cover differs significantly among HOLC classifications, $\chi 2(3) = 34.78$, $p < 0.001$. A significant difference in Canopy Cover among HOLC map classes was found using a post-hoc analysis, where A > B, A > C, and A > D ($p < 0.01$). Residents living in A classified locations have almost 1.4 times as much tree canopy as those residing in B, C, and D classified locations.

Discussion

Given the strong spatial association between historical disinvestment and the distribution of present-day tree canopy, concentrations of persons of color, persons in poverty, and neighborhood proximity to environmental hazards (Superfund sites), it is essential that urban foresters focus their efforts on relationship-building and engagement with impacted, disadvantaged, and neglected populations. An understanding of city history could be required for urban foresters seeking to advance environmental justice goals in practice.

In urban forest management and environmental management as a whole, there is an increasing call for fair and equitable practices that consider power structures and community involvement. Studies such as Watkins et al. (2017), Carmichael and McDonough (2018, 2019), and Nesbitt et al. (2019a) reflect this growing consensus on environmental justice norms and principles. However, there has been little exploration of how these principles are defined and implemented, as well as the factors that enable or hinder their implementation, especially from the perspective of stakeholders with the most influence over urban forest management (Grant et al., 2022). Our research aimed to fill this gap.

Urban foresters in San Francisco stressed the importance of Proposition E in ensuring that environmental justice principles are implemented. They emphasized the need for a fair distribution of tree maintenance procedures and addressing associated costs and labor concerns. Previous research has shown that distributional elements of environmental justice are not only about ensuring the equitable distribution of urban trees but also about maintenance procedures (Grant et al., 2022). A recent review of environmental justice in US UFMPs found that only 12 of 107 UFMPs addressed the inequitable distribution of maintenance procedures, and San Francisco was one of them (Grant et al., 2022). San Francisco's UFMP prioritized a dedicated funding stream to support street tree maintenance, successfully implemented through Proposition E (City of San Francisco, 2014; San Francisco Public Works, 2017).

Enacting a policy like Proposition E necessitates political determination and a substantial municipal operating budget. In the US, urban forestry departments at the municipal level (particularly in post-industrial cities with decreasing populations) are often underfinanced, leading to inadequate resources for proper tree management (Vogt et al., 2015; Roman et al., 2021). It may not come as a surprise that San Francisco, being one of the wealthiest cities in the US, was able to pass a Charter amendment like Proposition E. However, other cities in the country can explore different methods to prioritize the growth and protection of urban forests in their municipal operating budgets. In light of recent events, there has been a growing movement among activists, academics, and policymakers to redirect funding from police and carceral institutions toward social services and parks, especially since the murder of George Floyd in 2020 (Landau, 2020; Hoover and Lim, 2021; Davis and Edge, 2022).

One potential solution to address distributional environmental injustices in the urban forest is to implement progressive structural policy changes, like Proposition E. This could involve divesting from police and carceral institutions, adopting abolitionist practices and ecologies, and investing in urban forests and parks. Such changes may lead to a more equitable and sustainable urban environment (McDowell and Fernandez, 2018; Landau, 2020; Heynen and Ybarra, 2021). In addition, relieving property owners of the responsibility and liability of maintaining urban trees could lead to a rise in the number of trees in areas with a large population of households that cannot afford them. It would be beneficial for other municipal governments and researchers to observe how Proposition E is being implemented in San Francisco, assess its effectiveness in promoting equal distribution of resources, and consider adopting comparable policies or practices.

San Francisco's Proposition E may help address maintenance inequalities but cannot be used to plant new trees. Interviews with urban foresters in Seattle and San Francisco revealed that planting trees is hindered by limited plantable space, particularly in low-canopy neighborhoods with high impervious surfaces. These neighborhoods typically have a higher percentage of racialized individuals, higher poverty rates, and have experienced redlining and disinvestment for many decades. Urban governance stakeholders and urban foresters must acknowledge and understand these factors. Studies have shown that redlined neighborhoods in US cities often have lower tree cover and higher air temperatures (Hoffman et al., 2020; Namin et al., 2020; Locke et al., 2021). Additionally, poorer neighborhoods and neighborhoods with higher proportions of racialized people tend to have greater impervious surface areas, threatening the presence and growth of urban trees (Ogneva-Himmelberger et al., 2009; Huang et al., 2011). As cities continue to urbanize and densify, impervious surface areas increase, making it difficult to plant trees (Nowak and Greenfield, 2012, 2020), especially larger stature trees (Riedman et al., 2022). Interviewees from Seattle mentioned that municipal urban forestry departments, along with other City departments involved in urban forestry, are limited in their ability to plant trees in areas with high amounts of impervious surfaces, such as dense residential areas with limited sidewalk space and industrial areas.

To tackle the unequal distribution of trees in urban areas, cities need to show determination and allocate adequate financial resources to decrease the amount of non-porous surfaces in crowded urban communities, particularly in areas with low tree coverage and limited private open spaces. When making policies, local governments need to take into account the relationship between the absence of environmental resources, like urban trees, in disadvantaged and neglected areas and the structural inequalities present in these communities (e.g., redlining, systemic racism, white supremacy) (Schell et al., 2020; Heynen and Ybarra, 2021; Alvarez, 2022). To create more room for street trees and

to address distributional inequities in tree cover, municipalities should consider implementing programs to remove concrete in neighborhoods with low canopy coverage and high amounts of impervious surfaces. Several cities in the US have already started implementing such programs. For example, The Pennsylvania Horticultural Society's Tree Tender Program collaborates with the City of Philadelphia to facilitate the planting of street trees by providing free concrete cutting and removal services (PHS Programs, 2022). If a street tree location is approved and the property owner accepts responsibility, the City of Philadelphia will remove the concrete from the sidewalk at no cost, and a volunteer from the Tree Tenders program will plant the tree (PHS Programs, 2022). Many cities require public advocacy and collaboration among non-profit organizations and municipal departments to increase their urban forestry capacity. Such partnerships can facilitate the implementation of novel and equitable changes to infrastructure, such as tree-planting programs that involve removing concrete.

Maps created by the HOLC have had a lasting impact on real estate practices in many US cities, making it difficult for people living in certain areas to access mortgage financing and become homeowners (Aaronson et al., 2021; Nowak et al., 2022). Researchers have found that all locations categorized as "class D" have lower tree cover and more impervious cover (Locke et al., 2021; Nowak et al., 2022). This is true in San Francisco and Seattle, where historically redlined "D" areas have the lowest tree cover. Over time, divestment and municipal neglect in redlined areas have led to lower property values, making these areas attractive to speculative developers and urban renewal programs seeking to catalyze economic growth (von Hoffman, 2003; Gould and Lewis, 2016). Unfortunately, this often results in the gentrification and displacement of long-term residents, particularly those with low incomes (Vale, 2013). Interview participants from Seattle explained that historically redlined areas like South Park had become development hotspots where long-term residents are displaced due to increased housing costs.

Like San Francisco and Seattle, many US cities have begun prioritizing planting trees in low-canopy neighborhoods to achieve distributional environmental justice goals and address historical disparities in tree cover (Grant et al., 2022). However, recent research has found that some city residents view urban tree planting as a sign of gentrification (Riedman et al., 2022). Interview participants from both San Francisco and Seattle discussed how residents are concerned with gentrification and subsequent displacement. Despite the acknowledgment among urban foresters in both cities that residents are concerned with trees leading to and/or being representative of gentrification, and despite recent literature acknowledging the association between tree planting and gentrification (see Donovan et al., 2021), US UFMPs published to date have not included strategies for averting gentrification or displacement (Grant et al., 2022). Concerns related to "green gentrification" have been explored by others who have focused more broadly on the impact of city parks and greenspace (Curran and Hamilton, 2012; Wolch et al., 2014; Rigolon and Németh, 2020).

To address gentrification and displacement concerns among residents, municipalities and urban foresters need to involve communities in decision-making, and especially prioritize engagement with those in neglected and disadvantaged areas. While urban trees can increase property values (Donovan et al., 2021), a collaboration between urban foresters, urban planners, city government departments, housing non-profits, activists, and community groups is essential to address the issue. This collaboration should focus on improving or democratizing community engagement and finding ways to integrate anti-displacement policies and planning (Rigolon and Németh, 2018). Seattle's interviewees highlighted the impact of redlining and gentrification on community trust, relationships, and beliefs toward city planning. Grant et al. (2022) underscored the importance of urban foresters considering the historical, political, and institutional factors that shape marginalized groups' perspectives, experiences, and preferences in achieving recognitional justice. Acknowledging the lasting multigenerational legacy of redlining on communities and urban infrastructure is essential for urban foresters to advance recognitional justice in Seattle.

Advancing procedural and recognitional justice in urban forestry requires planners and practitioners to prioritize community-driven engagement. In San Francisco, some interviewed urban foresters preferred a top-down approach to community engagement (i.e., identifying solutions internally with a team of "experts" and then convincing residents to buy into them) rather than a community-driven or democratized approach. Top-down approaches to community engagement are usually unsuccessful in generating or sustaining resident interest in urban tree planting or care or in urban planning issues more broadly (Campbell-Arvai and Lindquist, 2021). Moreover, top-down community engagement usually produces urban greenspaces that are not sensitive to the needs, preferences, or interests of diverse city residents due to the lack of genuine and authentic community involvement; they also perpetuate unequal power relations between decision-makers and residents (Campbell-Arvai and Lindquist, 2021; Kiss et al., 2022). Since interviews for this research were conducted, there have been changes to organizational values at San Francisco's leading urban greening non-profit, FUF. This organization has recently adopted environmental justice as one of its core values, noting that they "ground [their] work in justice movements, recognizing and addressing environmental harm caused by racism" (Friends of the Urban Forest, 2023). This prioritization of justice signals that FUF's engagement with San Francisco neighborhoods may be evolving to become more community driven.

During interviews with Seattle's urban foresters, the importance of prioritizing disadvantaged and neglected communities in their engagement and planning approach was emphasized. This community-driven and intentional approach is evident in Seattle's 2020 UFMP and reflects a municipal commitment to environmental justice. To build more just and sustainable urban communities, there have been calls to center the needs, capacities, preferences, knowledge, and priorities of disadvantaged and neglected groups (Campbell et al., 2022; Grant et al., 2022). Seattle's engagement and UFMP offer a strong example of this approach. Interviewees acknowledged Seattle's RSJI framework and training program as providing a solid foundation for urban foresters to understand the intersections between environmental justice, racial equity, and urban forests. Study participants credited RSJI as

helping urban foresters engage in self-education and self-reflection, which is essential in uncovering and recognizing how institutional policies and practices perpetuate environmental injustices. There is a great need for urban foresters to uncover and acknowledge how systems of oppression, such as class inequality and structural racism, permeate institutional policies and practices to reproduce environmental injustices; this self-education/reflection process is essential in the transition to more just urban forests (Schell et al., 2020; Dean et al., 2021).

While many volunteers are involved in tree-planting and stewardship programs, Seattle interviewees shared that these volunteers tended to be white and not from the neighborhoods where urban forest work was occurring. Thus, volunteers are unlikely to share the same demographic profile of the residents in whose community they are working. This finding is not unique to Seattle; tree-planting volunteers across many US cities tend to be white, most of which are highly-educated, white women (Johnson et al., 2018; Elton et al., 2022). Structural racism, white supremacy, and historic divestment have significantly impacted racialized neighborhoods in the US, particularly Black neighborhoods (Schell et al., 2020; Alvarez, 2022). When white volunteers plant trees in historically Black or disinvested neighborhoods, it can reinforce power dynamics, especially where outsiders have made decisions about the local community's environment. This can undermine the agency of long-term residents in shaping their own urban forest and greenspace based on their own needs and priorities. To avoid creating unjust conditions such as "unintended" gentrification and displacement, non-profit organizations and municipalities working with volunteers must be aware of their role in reproducing or enabling uneven power dynamics. Procedural and recognitional justice must not be overlooked in these scenarios.

Conclusion

This research delved into the perspectives of urban forest professionals in San Francisco and Seattle, including those employed by the local government and non-profit organizations. The study aimed to gather insights on how interviewees approach and implement environmental justice in urban forestry planning and practice. Urban foresters in each city revealed distinct yet complementary approaches to addressing environmental injustices. San Francisco focused on addressing inequities in tree maintenance distribution, while Seattle prioritized community-driven engagement processes and recognized the impact of historic urban planning decisions on marginalized groups. The RSJI in Seattle and Proposition E in San Francisco have been instrumental in helping urban foresters to identify and address injustices in urban forest planning and practice. However, achieving justice across all three pillars (distributional, procedural, and recognitional) remains challenging in both cities. In particular, realizing recognitional justice presents a complex challenge.

To achieve greater environmental justice, urban foresters must recognize the association between the presence/absence of tree canopy cover, historical neighborhood disinvestment (e.g., redlining), proximity to environmental hazards (e.g., Superfund sites), and the spatial distribution of racialized and poor communities. Moreover, urban foresters must recognize the role trees play in increasing city property values and appreciate that some communities view newly planted trees as a signal of gentrification. Additional research is needed to better understand these concerns, especially in realizing more just urban forest planning and practice. Urban foresters and housing planners must collaborate to implement anti-displacement policies considering the potential for green gentrification. Self-education and reflection among urban foresters, in a way that interrogates power dynamics within the structures and systems they are part of, is fundamental to advancing recognitional justice and building trust with neglected and disadvantaged communities.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors following request. Identifying information will not be shared to protect the privacy of the research participants.

Ethics statement

The studies involving human participants were reviewed and approved by the Toronto Metropolitan University Research Ethics Board (REB) Approval Number 2017-398-3. The patients/participants provided their written informed consent to participate in this study.

Author contributions

AG: conceptualization, methodology, data collection, formal analysis, investigation, writing—original draft, and writing—review and editing. AM: methodology, formal analysis, investigation, resources, writing—original draft, writing—review and editing, and visualization. SE: formal analysis, investigation, resources, writing—original draft, and writing—review and editing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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