

Assessment of the Urban Forestry Landscape for Promising Equity-Focused Policies and Practices



THE NATURE CONSERVANCY 2021 CAPSTONE TEAM

LITERATURE REVIEW

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TABLE OF CONTENTS

ABSTRACT

OVERVIEW

METHODOLOGY

RESEARCH QUESTIONS

(i) WHAT PROMISING PRACTICES, ARE OTHER CITIES USING TO ENSURE MORE
EQUITABLE URBAN FORESTRY PROGRAMS?

Partnerships

Assessing Distribution

Equity Performance Metrics/Indicators

Percentage of Tree Canopy Increased in Specific Area

Social Equity in Urban Resilience Planning

Distributional Equity

Recognitional Equity

Procedural Equity

Funding

Equitable Pathways to Green Careers

Prevention of Greening Gentrification

(ii) HOW CAN INTERAGENCY AND EXTERNAL COLLABORATION STRENGTHEN AND
CLARIFY THE ROLES AND RESPONSIBILITIES INVOLVED IN URBAN FORESTRY
PROGRAMS?

Dedicated Committee/Task Force

Clear Roles and Responsibilities

Shift the Responsibility of Tree Maintenance from Property Owners to Local Government

Collaborating Towards Common Goals & Climate Resilience

Target Cities Matrix

TARGET CITY WRITE-UPS

CASE STUDY CITY WRITE-UPS

SUMMARY

EVALUATION

WORKS CITED

ABSTRACT

Urban forests provide a wide range of ecosystem services and resilience against the impacts of climate change. However, research shows that inequitable urban tree canopy (UTC) distribution is linked to socioeconomic and racial demographic factors. As temperatures continue to rise in U.S. cities, the adverse implications of the urban heat island (UHI) effect will disproportionately influence socially vulnerable communities. Ensuring equitable distribution of UTC in cities throughout the U.S. is necessary to enhance procedural and distributive equity in urban forestry programs. The team researched urban forestry practices in eighteen U.S. cities to answer the following questions: (i) What promising practices are major U.S. cities using to ensure more equitable urban forestry programs in the face of climate change? (ii) How can interagency and external collaboration strengthen and clarify the roles and responsibilities involved in urban forestry programs? In total, the team identified thirteen promising practices among the selected target cities that support equitable urban forestry programs and robust interagency and external collaboration. These include the following:

multi-sector partnerships, assessing distribution, equity performance metrics/indicators, social equity in urban resilience planning, funding, equitable pathways to green careers, preventing green gentrification, dedicated committee/task force, clear roles and responsibilities, city maintenance of public trees, collaborating towards common goals, cross-sectoral climate resiliency planning, and policies and ordinances.

OVERVIEW

Accelerated urbanization has resulted in urban heat islands that amplify the negative impacts of extreme heat. Vegetated landscapes have transitioned into impervious surfaces, such as asphalt, concrete, and steel, that have low albedo feedback and retain heat. In addition, anthropogenic activities have increased greenhouse gas emissions and anthropogenic heat production from industrial processes and cooling systems. This has cascading effects on the environment, public health, and the economy as climate change intensifies in U.S. cities. Urban trees can mitigate the impacts of climate change while providing ecological, social, and economic benefits. However, due to the inequitable distribution of urban tree canopy that can be generally attributed to redlining practices that began back in the 1930s, marginalized communities face greater vulnerability to the effects of climate change.

To enhance procedural and distributive equity in urban forestry programs, many cities have recently incorporated an equity approach to their planning processes. Programs that integrate recognition, distributive, and procedural equity can progress UTC efforts towards established city-wide canopy goals. To optimize equitable tree planting projects, urban forestry programs must consider cross-sectoral funding, maintenance, and management policies that ensure the long-term success of these initiatives. Moreover, interagency coordination and collaboration with external entities can strengthen urban forestry programs while providing various funding and community engagement opportunities.

This paper evaluates the target cities listed below and their urban forestry programs in an effort to answer the following questions: (i) What promising practices are major U.S. cities using to ensure more equitable urban forestry programs in the face of climate change? (ii) How can interagency and external collaboration strengthen and clarify the roles and responsibilities involved in urban forestry programs?

Table 1: Cities Included in the Evaluation

Target Cities				Case Studies	
Austin, TX	Boise, ID	Cincinnati, OH	Detroit, MI	Albuquerque, NM	Chicago, IL
Miami Beach, FL	New York, NY	Pittsburgh, PA	Portland, OR	Los Angeles, CA	Palo Alto, CA
Providence, RI	San Francisco, CA	Salt Lake City, UT	Seattle, WA	Phoenix, AZ	Tacoma, WA

Target Cities				
Austin, TX	Boise, ID	Cincinnati, OH	Detroit, MI	Chicago, IL
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Providence, RI	San Francisco, CA	Salt Lake City, UT	Seattle, WA	Tacoma, WA

METHODOLOGY

Based on our team’s initial background research, we formed two additional questions to further our research on assessing equity-focused promising practices and policies in cities across the U.S. To determine the target cities included in this literature review, we individually researched different regions of the country to identify cities with promising urban forestry programs related to equity and clear roles and responsibilities. This included reviewing urban forest master plans, city-wide sustainability plans, academic papers, websites, and other publicly available information about various programs and organizations addressing urban forestry throughout each city. The team also gleaned potential promising cities by leveraging The Nature Conservancy’s internal knowledge and network. At this stage of our research, the team is reviewing each city broadly looking for key equity and collaborative initiatives. After completing individual research, each team member presented promising practices in a few select cities and, through discussion, the team identified common themes among them to determine the list of target cities included in this paper. Due to capacity, cities that showed promise but potentially not as

strong were categorized as case studies, meaning they will not necessitate interviews with stakeholders in those cities and will focus on a specific practice, policy or program. Promising practices in equitable urban forestry programs were identified through analyses of available research and online data on selected target cities and tree equity in general. These practices consist of: multi-sector partnerships, assessing distribution, equity performance metrics/indicators, social equity in urban resilience planning, funding, equitable pathways to green careers, preventing green gentrification, dedicated committee(s)/task force(s), clear roles and responsibilities, city maintenance of public trees, collaborating towards common goals, cross-sectoral climate resiliency planning, and policies/ordinances. Lastly, we provided preliminary recommendations and future research needed based on an evaluation of our own research through the literature review.

RESEARCH QUESTIONS

(i) WHAT PROMISING PRACTICES ARE MAJOR U.S. CITIES USING TO ENSURE MORE EQUITABLE URBAN FORESTRY PROGRAMS IN THE FACE OF CLIMATE CHANGE?

Partnerships

Partnerships between government agencies, non-government organizations (NGOs), and the private sector have been proliferating community benefits for decades. Specifically, during the 1970s and early 1980s there were drastic cuts in financial aid to municipalities, leading to many NGOs stepping up to fill this void. Services such as tree planting programs began to move from a government-provided service to a NGO-provided service in many areas (Seamans 2012). In a 2013 study, Locke et al. summarized the importance of partnerships in achieving urban tree canopy goals well by stating, “Independent action is inadequate: no agency, organization, single landowner or business has sufficient funds or land to achieve a city’s [urban tree canopy] goal. Coordination and collaboration are needed and depend upon identifying common or complementary interests, categories of programs, or areas for action” (Locke et al. 2013).

Assessing Distribution

A common promising practice for progressing equity within a city or town’s urban forestry program is collecting data to identify (i) if there is a need for increased tree canopy (e.g., identifying the disproportionate concentration of environmental burdens vs. amenities in communities), (ii) if so, where the need for increased tree canopy is, and (iii) the severity of the need (e.g., a neighborhood with 7% coverage would potentially be at a higher severity need of tree coverage than a neighborhood with 15%). This is typically done through an UTC Assessment. The NGO American Forests played a monumental role in providing these data when they unveiled the Tree Equity Score Project for a plethora of U.S. cities in 2021. The Tree Equity Score Project utilizes Geographic Information System (GIS) overlay mapping of an area’s tree canopy percentage compared to its income and race demographics to provide visuals and data on a city or town’s tree equity score. These data are extremely valuable for assessing equitable UTC distribution and can help cities identify neighborhoods in need. American Forests can calculate this data for cities or towns with at least 50,000 people, although they have not done this work for every city. Many

cities have also completed their own UTC Assessment, oftentimes partnering with a university, consulting group, or NGO for assistance.

Equity Performance Metrics/Indicators

Once data are collected on the distribution of trees in a community, it is important to start measuring specific metrics and indicators to track the success of the program or project put in place. Danford et al. describes the importance of metrics writing that, “Policy makers tout the benefits of urban canopy and the importance of increasing the urban forest and claim a focus on redressing inequity in urban canopy cover. However, the success of these programs is seldom measured and *the actual potential to remedy inequities is unknown* [emphasis added]” (Danford et al. 2014, p. 4). While equity is still a fairly new concept within the urban forestry realm, the following are some promising equity metrics and indicators seen throughout the nation.

Percentage of Tree Canopy Increased in Specific Area

Many cities are placing targets on increasing their overall urban tree canopy (Vibrant Cities Lab n.d), however, targeted canopy goals for areas in need is a stronger indicator of equitable distribution (Schwartz et al. 2015). When there are no place-based goals, disparity can actually be exacerbated if tree planting efforts go to areas that already have ample tree canopy or are not facing particular hardships (Garrison 2017).

Addressing Specific Local Needs or Issues

An area having low tree canopy does not always equate to it having the highest need for tree canopy. Some areas may be inundated with industrial pollution and have high asthma rates, necessitating increased tree canopy to help combat both the air quality and the soil quality (phytoremediation). Each area is different with their own localized issues and needs. This can also mean tying tree canopy goals to current equity goals in other community plans, such as utilizing tree canopy to assist in energy equity goals (Daley 2020).

Incorporation of Social Equity in Urban Resilience Planning Framework

Low-income communities and Black, Indigenous, and People of Color (BIPOC) in urban areas have long been concerned with the disproportionate weight of environmental hazards they face and the unequal distribution of environmental amenities that consistently disfavor their neighborhoods. The absence of decision-making and policy-making processes available to these communities have forced them to suffer related public health burdens and detrimental impacts on quality of life (Agyeman et al. 2003). The incorporation of an equity framework can be the first step towards making urban forestry planning and implementation processes more equitable and just. As it stands, there is no formal equity framework within the field of urban forestry that can inform equity analyses (Nesbitt et al. 2018).

One promising equity framework that emerged in the literature is the *social equity in urban resilience planning framework* used to assess urban resilience planning efforts and the inclusion of social equity considerations, namely the *distributional*, *recognitional*, and *procedural* dimensions of equity (Meerow et

al. 2019). While cities are increasingly ramping up their efforts to enhance resiliency, critics argue that the urban resilience agenda inadequately addresses social equity and benefits remain inequitable (Meera, et al. 2019). According to researchers, practitioners can reconcile the historical blind spots of urban resilience “by making the inevitable negotiations about how to apply resilience and associated tradeoffs the focus – questions of resilience for whom, what, when, where, and why?” (Meerow and Newell 2019; Harris et al. 2017). Such negotiations could be baked into the development of a social equity in urban resilience planning framework.

At the center of the framework are the following three dimensions of equity that shape the resilience of vulnerable communities and determine whether they are equipped to handle shocks and stressors related to environmental or climate disruptions.

Distributional Equity

Defined as equitable access to goods and infrastructure, environmental amenities, services, and economic opportunities (Meera et al. 2019). This includes the equitable distribution of environmental goods like tree canopy and ensuring that those most in need have access to the benefits trees provide.

Recognitional Equity

By definition, this concept (i) acknowledges the intersecting identities of different community members (e.g., race, gender, class, and age), (ii) recognizes that such identities are shaped by historical injustices and can influence individual vulnerability to shocks and stresses, the ability to access resources, and capacity to participate in decision-making, and (iii) fosters respect for different groups (Meera et al. 2019). In practice, recognitional equity can look like city officials acknowledging the history of redlining that has led to inequitable UTC and identifying pathways towards addressing it or ensuring that urban forestry departments have stable funding to develop culturally relevant and multilingual educational resources.

Procedural Equity

Defined as equitable participation in decision-making processes, which includes public participation in the development of the plan, efforts to increase ongoing public participation in city governance, and targeted outreach to marginalized groups that often are underrepresented in traditional public engagement processes (Meera et al. 2019). In the context of urban forestry, an example of this could be the creation of a task force or working group that has member representatives from disproportionately impacted communities, who are given the power to make decisions on the urban forest within their neighborhoods.

Funding

Amid constant municipal budget pressures, funding urban forest initiatives is one of the most prominent challenges that impedes progress in the field (Gulick 2016). Some researchers cited a case study of an urban forestry program that spanned 12 U.S. cities and was deemed unsuccessful due to a lack of consistent funding and city budgeting (Johnson 1982; Grado et al. 2006). Traditionally, municipal urban forest management program funding comes from the general fund – a single primary source. Urban

forestry initiatives are in continuous competition for funding from the city budget (Grado et al. 2006). Funding for essential services typically take precedence over urban forestry projects that may be perceived as ‘nice to have’ but not absolutely necessary. To ensure that urban forestry budgets are sustainable and safe from the fluctuations of the economy and other external forces, funding must be secured from multiple stable, long-term sources to ensure that maintenance and staffing needs can be maintained.

Equitable Pathways to Green Careers

Maintaining and growing a city’s urban forest is an ongoing process that requires a variety of skilled workers (urban forester(s), maintenance crews, etc.). Hiring local talent for tree maintenance and urban forestry work presents an opportunity for cities to involve local community members in the creation of sustainable green jobs related to urban forestry, from tree planting to routine maintenance. Job training and mentorship programs in urban forestry “bolster local and regional economies, improve individual and public health and welfare, and promote lasting stewardship practices” (Vibrant Cities Task Force 2011, p. 18). Research also shows that green job training provides opportunities for intellectual stimulation and a personal sense of accomplishment (Falxa-Raymond et al. 2013). However, a number of barriers exist for low-income and BIPOC communities to enter public-sector urban forestry jobs such as a lack of targeted outreach and convoluted application processes, and this highlights the need for job training and mentorship programs (Ecotrust & PolicyLink 2017). Promising practices identified in target cities commonly involve at-risk youth, formerly incarcerated individuals, and underserved community members in programs to ensure that it benefits those most in need and provide lifelong skills for careers in the green industry.

A promising national program that recently launched in a handful of cities is the TAZO Tree Corps, which is a partnership between American Forests and TAZO Tea. The Tree Corps is a locally hired and paid workforce that will create jobs in tree planting and maintenance in disadvantaged communities in hopes of achieving tree equity. The initial launch of the project began in Spring 2021 in Minneapolis, the San Francisco Bay area, and Detroit. The corps will expand in 2022 and will include Richmond, VA and the Bronx, NY. Five fellows will be selected to partake in 2-3 weeks of paid urban forestry training that will transition into a full-time position with The Davey Tree Expert Company (American Forests, n.d.). Similar approaches to green jobs programs are described in further detail in the target city write-ups, but the Tree Corps was identified as a strong example to support this practice.

Preventing Green Gentrification

New research has shown that when underinvested areas undergo “greening” projects (e.g., new or renovated parks, improved green spaces, etc.) gentrification can potentially be trailing quickly behind. Rent and property tax increases can cause displacement for the very residents the green initiatives were often supposed to help, resulting in some communities being wary of efforts put forth to improve the environmental quality of their community (Jelks et al. 2021). Thus, if equity is to be truly addressed within a city or town’s urban forestry plan, green gentrification must also be analyzed and addressed, and at bare minimum acknowledged. While there are general promising practices being suggested in this

realm — such as researchers and social justice groups calling for green policy initiatives to be paired with housing policy initiatives to mitigate displacement — further research and case studies need to be conducted around this area to best help guide and inform cities doing equitable urban forestry work (Gould & Lewis 2018, p. 12-15; Gibbons et al., 2020). Since the research around this issue is new and extremely complex, the MENV team gave target cities an “X” in the matrix below on promising practices if they at least acknowledged greening gentrification as a potential issue.

(ii) HOW CAN INTERAGENCY AND EXTERNAL COLLABORATION STRENGTHEN AND CLARIFY THE ROLES AND RESPONSIBILITIES INVOLVED IN URBAN FORESTRY PROGRAMS?

A multitude of municipal stakeholders impact UTC efforts on the local and regional scale. Thus, interagency coordination and external collaboration are essential components to effectively managing the urban forest. If there is a lack of clarification or effective communication, it can result in counterproductivity, conflicting interests, and incomplete projects. Urban forestry programs can be improved by developing a dedicated committee or task force that includes various perspectives and expertise. Furthermore, roles and responsibilities should be clearly outlined and defined in the planning process to avoid confusion. Developing partnerships between NGOs, community groups, and additional stakeholders can enhance urban forestry efforts through collaborative tree planting initiatives. Moreover, hosting regular meetings, seminars, workshops, and additional coordination techniques can reduce overlap between external entities. Planners, politicians, and relevant stakeholders should encourage knowledge sharing between departments and partake in collaborative training events to strengthen relationships between agencies. Urban forestry and climate equity should be integrated in cross-sectoral planning efforts to ensure longevity and resilience. Utilizing practices that enhance organizational psychology can lead to interagency transformations that catalyze action on the local scale.

To optimize urban tree management and to achieve established UTC goals, local governments should consider maintaining street trees in the public right-of-way, especially for projects that aim to enhance equity. For lower income communities, tree maintenance can be a financial burden that residents cannot afford. Developing programs that assist communities by providing funding opportunities can alleviate the financial barriers associated with the equitable distribution of urban trees.

Dedicated Committee/Task Force

Dedicated committees and/or task forces around tree programs (such as a climate action committee that addresses tree canopy, an environmental justice committee, or a street tree committee) can provide long-term sustainability while serving as a place to hear and incorporate community feedback and concerns. Collaboration is critical to achieve more equitable, climate-resilient urban tree canopy outcomes. Additionally, city-run committees can help align federal programs, such as the U.S. Department of Housing and Urban Development or the U.S. Department of Transportation, to best support local priorities and goals (Vibrant Cities & Urban Forests Task Force, n.d.).

Clear Roles and Responsibilities

Clearly identifying the various roles and responsibilities related to urban forest management improves coordination between agencies, NGOs, and other organizations to maximize efficiency and ensure that efforts are complementary rather than conflicting. Frameworks for collaborative governance related to nature-based solutions, such as urban forestry, stress the importance of determining who should be involved based on influence and interest. This helps determine the appropriate role for participating collaborators, though the framework notes roles are not static and may change as collaboration continues (Malekpour et al. 2021). Establishing the roles and responsibilities varies based on the city, but it is common to outline this in an urban forest plan or other city-wide plan.

Shift the Responsibility of Tree Maintenance from Property Owners to Local Government

Various U.S. cities require that property owners maintain trees in the public right-of-way and adjacent sidewalks. However, some property owners may not have adequate tree care knowledge to keep trees on their property in healthy condition. From an equity perspective, tree maintenance may add to the burdens that residents living in underserved areas already experience (Seo 2020). Tree maintenance requires financial capacity, skill, time, and labor – all of which pose additional constraints to communities.

San Francisco is an excellent case study of what to do (and what not to do) to ensure that urban forests remain healthy. To save on costs, San Francisco placed the onus of tree and sidewalk care on property owners. As a result, the health of their urban forest declined because some owners had a difficult time justifying trimming costs and eventually cut the trees down or pruned them without having proper training (Vibrant Cities Lab, n.d.). However, in 2016 the city passed Ballot Proposition E that authorized the transfer of maintenance responsibility for tree and sidewalk care to the Department of Public Works and a \$19 million mandate to fund the program annually (Vibrant Cities Lab, n.d.). Shifting the responsibility of tree maintenance to the local government instead of property owners can help ensure trees are getting what they need, when they need it.

Collaborating Towards Common Goals

Maintaining a healthy urban forest requires an interdisciplinary approach and various forms of knowledge and expertise. However, many urban forestry programs have cited issues arising due to conflicting interagency interests and institutional silos. A silo is defined as “the sectoral division of management, whether by tasks or thematic division, and where there are differences in institutional logics, workings and culture, inhibiting cross-sectoral work” (Oseland 2019). The division of responsibilities associated with urban forestry and climate policy can impact the success of planning and implementation initiatives. Cities are developing tree canopy goals, but they must ensure that newly planted trees will not infringe upon ADA requirements, utilities, and additional infrastructure. To adequately address these concerns, urban forestry programs should coordinate efforts and clearly outline the roles and responsibilities associated with risk mitigation and planning processes. In accordance with Cashmore and Wejs (2014, p. 203), “coordination is posited to be essential if undesirable trade-offs are to be avoided and potential synergies exploited”. Moreover, considerations that examine the interrelationships between politicians,

planners, and implementation should be conducted. Political commitments to climate adaptation strategies, such as urban forestry efforts, can significantly influence the materialized outcomes of thematic municipal sub-plans (Oseland 2019).

To break down interagency silos, stakeholders must consider the challenges associated with bureaucratic hierarchy. One climate planner has stated, “it is really challenging to sit quite far down the hierarchy and make a plan to change the society” (Oseland 2019). Since urban forestry is cross-sectoral, relevant stakeholders must find a common ground between varying knowledge areas and negotiate to achieve UTC goals. By understanding the different methods and responsibilities associated with urban forestry efforts, stakeholders can work towards silo-breaking.

To improve collaborative efforts, relevant stakeholders should seek opportunities to build meaningful relationships by working together to achieve common goals. Working groups that constitute varying departments involved with UTC management, such as planning, urban forestry, natural resources, parks and recreation, water and renovation, finance, infrastructure and maintenance, public utilities, and business development groups, can enhance the development of municipal sub-plans. Representatives with significant expertise in their focus-area can discuss conflicting interests and determine suitable methods to dealing with these concerns. Moreover, working groups can discuss a variety of topics to understand how each department functions and contribute their respective interests into the planning process (Oseland 2019). Organizational psychology principles suggest that extraordinary working groups exhibit the following: shared leadership that encourages members to take mutual responsibility, just-enough-structure to create openness but not overly bureaucratic, full engagement from representatives that promotes enthusiasm, embracing differences and uses diversity as a strength, unexpected learning that translates into personal and group growth, and strengthened relationships among members characterized by trust, collegiality, and friendship (Bellman and Ryan 2009). The process of ‘teaming’ can coordinate communication with people across boundaries of all kinds – expertise, status, and distance. When policies are developed with a teaming approach, relevant stakeholders can perform knowledge sharing and conduct collaborative training that continuously improves urban forestry programs and working dynamics (Ugolini et al. 2015). Furthermore, municipalities should consider hosting regular meetings, seminars, and workshops to bolster coordination efforts.

Cross-Sectoral Climate Resilience, Equity, & Urban Forestry Planning

The interface of socio-ecological benefits derived from urban forestry can strengthen climate resilience in underserved communities. The social dimensions associated with climate governance suggest that stakeholders must understand the detrimental implications that a changing climate has on infrastructure and services to adequately address these concerns at the local level. Research recommends that climate action plans should be long-term, adaptable, and dynamic based on the localized impacts of climate change (Tang et al. 2010, p. 57). Additional frameworks suggest that climate policy should be integrated across various sectors of planning and survive with changing administrations (Adelle and Russel 2013). Thus, municipalities should consider the value of urban trees and understand how they can promote climate resilience in a cost-effective manner.

Trees provide a natural cooling effect from the process of evapotranspiration (ET) and shading (Fung and Jim 2019). ET refers to the net water that is lost from vegetation and soil surfaces as it evaporates back into the atmosphere as vapor. This process cools down the leaf and converts sensible heat flux to latent heat flux, which reduces surface and air temperatures in cities (Laguë et al. 2019, Gao et al. 2020). This thermodynamic conversion plays a significant role in soil-moisture dynamics, surface runoff, the Earth's surface energy budget, and atmospheric feedback (Laguë et al. 2019, Gao et al. 2020). In addition to ET, tree shading can attenuate the incident solar radiation from reaching urban materials, such as steel, asphalt, and concrete, which prevents surface and atmospheric warming (Fung and Jim 2019). Optimization of shading can be achieved through strategic planting based on urban geometrics and building height-density considerations. The species, height, length and diameter of the trunk, and crown radius impacts the tree's potential to reduce thermal perception (Bowler et al. 2010; Sabrin et al. 2021). Trees also offer a variety of other ecosystem services, including enhancements in stormwater management, improvements in air and water quality, carbon sequestration (Nowak et al. 2013), reductions in GHGs and energy consumption (Simpson and McPherson 1996; Pandit and Laband 2010), and physical and mental health benefits (Fung and Jim 2019). However, due to the inequitable distribution of UTC, marginalized communities often lack the ecosystem services provided by trees (Nyelele and Kroll 2020), leaving these communities at a higher risk to the social and physical impacts of climate change (Islam and Winkel 2017).

By integrating urban forestry, equity, and community engagement initiatives into climate action planning frameworks, local governance can promote procedural and distributive equity while enhancing mitigation and adaptation strategies. However, special considerations should be made for urban forestry initiatives that aim to address inequities in lower-income areas. In terms of urban forestry, resiliency management could include community and municipal stewardship that focus on the neighborhoods most in need of monitoring and maintenance assistance. Furthermore, many of these neighborhoods have historically been underserved, therefore it is vital that relevant stakeholders build trust and rapport with these communities. Municipalities can also work with community members to design equity toolkits that provide guidelines for all agencies to utilize when drafting new plans. Active support from political entities, agencies, volunteers, and nonprofits can bolster these efforts while incorporating UTC goals in cross-sectoral climate action planning processes.

Promising Policies & Ordinances

To enhance the preservation of urban trees, cities should develop ordinances and regulations that can practically achieve UTC goals. Comprehensive plans are only as strong as their implementation, and regulations can ensure that specifications have legal authority. In accordance with Vibrant Cities Lab, these policies could constitute stormwater operation and maintenance, erosion and sediment control, subdivision low-impact-design requirements, construction and post construction standards, tree protection ordinances, capital project requirements and reviews, and parking lot specifications (Vibrant Cities Lab n.d.). Researchers recommend that tree ordinances should clearly state goals, designate responsibilities with granted authority, set basic performance standards, be flexible, specify enforcement methods, be developed as part of a comprehensive management plan strategy, and developed with community support (Barker et al. n.d.).

One study performed UTC spatial autoregressive modeling which examined the distribution disparities for non-White populations in North Carolina neighborhoods (Kolosna and Spurlock 2019). Based on the researchers' analysis, they recommended developing a citywide UTC goal that is built into comprehensive planning efforts. By integrating ordinance regulations and standards, a municipality can balance the pace of development with UTC minimums. In policy frameworks, the minimum UTC requirements should be increased for residential land uses and zoning districts (Kolosna and Spurlock 2019). Moreover, cities should consider adopting a 1:1 ratio of tree planting replacement for trees that must be removed for development purposes (Kolosna and Spurlock 2019). If mitigation cannot be performed, developers can pay a fee that goes into the urban forestry fund and supports tree planting initiatives in suitable areas. Tree preservation ordinances can provide insight on how a municipality values the social, economic, and ecosystem services associated with the urban forest (Lavy and Hagelman 2019). Research suggests outlining the benefits that trees provide within the ordinance; however, preservation and development goals will vary between communities based on their individual needs (Lavy and Hagelman 2019). By integrating an equity component within a policy framework, cities can make strides to enhance the distribution of UTC in underserved neighborhoods. Cities can take an innovative approach to developing ordinances by connecting equity and environmental factors, such as affordable housing development and brownfield redevelopment regulations, anti-displacement policies, and revitalization projects, to UTC efforts.

Seattle, WA	X	X		X		X	X	X	X		X		X
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*Case studies are not included in the matrix because many only focus on one or two promising practices and it does not present as broad of an analysis as target cities

PROMISING PRACTICES FROM TARGET CITIES

Austin, TX - While equity is not a central focus in Austin’s 2013 Urban Forest Plan, the city shows a variety of promising practices, policies, and programs outside of the plan that contribute to equitable urban forestry efforts such as the city’s Climate Equity Plan and Community Tree Priority Map described below.

<p>Partnerships</p>	<p>Urban forestry efforts are made possible by numerous public-private partnerships. One key partnership identified in our research that is contributing to equitable canopy distribution and urban forest management is the work between the City of Austin and TreeFolks. The NeighborWoods Program is a partnership between the nonprofit organization TreeFolks and the City of Austin’s Parks and Recreation Department with support from Austin Energy. The NeighborWoods program provides free trees to residents to combat the urban heat island effect through increased tree canopy while also reducing resident’s energy consumption (TreeFolks n.d.). The trees serve a dual purpose and not only provide shade, but also contribute to the overall canopy diversity of the city’s urban forest. NeighborWoods recently started the Remove & Replace initiative that removes hazardous trees from low-income household properties and replaces them with healthy trees (TreeFolks 2020). TreeFolks’ efforts involve the local community in tree planting, raising awareness about the urban heat island effect and energy consumption, and also provide an essential service to underserved communities within the city.</p>
<p>Assessing Distribution</p>	<p>The Community Tree Preservation Division created the Community Tree Priority Map to be used as a tool for urban forestry programs, plans, and management. The map shows areas that should be prioritized for tree planting, community stewardship, and other activities related to urban forestry based on a score. The score is determined by information (provided on the map) about the environment (i.e., tree canopy), social vulnerability, community investment, and health & well-being in different areas of the city. This helps track past success of tree plantings and other stewardship activities. For example, according to the data on the map and past tree planting activities, 60% of tree planting happened in moderate to high need areas from 2015-2020 (Halter 2020).</p>
<p>Social Equity in Urban Resilience Planning</p>	<p>The City of Austin recognizes its long history of racial inequities and exclusion and through a number of efforts, the city is working to address racial inequality. The city’s Equity Office, established in 2016, works towards “advancing equity in all aspects of City operations” (City of Austin n.d.). Within the Equity Office is the Equity Action Team that helped develop the Equity Assessment Tool used to assess different departments’ impact on equity.</p> <p>In September 2020, Austin published a draft Climate Equity Plan for public comment that will be part of an update to the city’s 2015 Climate Action Plan. The Climate Equity Plan is designed to ensure Austin reaches the goals of the Climate Action Plan in an equitable manner. To develop and effectively implement the plan, the Community Climate Ambassador Program was created to reach out to historically marginalized groups whose voices were previously left out of citywide</p>

	<p>plans (City of Austin n.d.). The program aimed to facilitate conversations about topics such as energy, transportation, and access to nature with BIPOC communities and ensure their concerns and priorities were heard and considered prior to the planning process. The program sought out ambassador applicants who could engage with underrepresented communities about climate-related issues to identify challenges, barriers, and opportunities facing these groups. Meetings and interviews were facilitated by the ambassadors without City staff to ensure participants felt comfortable openly expressing their thoughts. Through a series of meetings and interviews, the twelve ambassadors identified key takeaways that fell into seven categories: a healthy environment, affordability, economic opportunity and empowerment, accessibility, cultural preservation, community capacity, and accountability (City of Austin, 2020). These categories are reflected in the goals and actions outlined in the Climate Equity Plan.</p>
<p>Funding</p>	<p>Urban forestry efforts are funded through a variety of sources that include the following:</p> <ul style="list-style-type: none"> ● The Urban Forest Grant funds stewardship projects such as tree planting and urban forestry-related education programs. Community groups, schools, government institutions, and nonprofit organizations are encouraged to apply for the grant (City of Austin, n.d.). This grant is co-managed by the Community Tree Preservation Division and the Austin Community Foundation (City of Austin, 2020) ● The Urban Forest Funding Portal provides funding for tree planting and care as well as educational outreach that exceeds what is already provided by departmental funding. The grants administrator in the Community Tree Preservation Division manages this internal funding program (City of Austin, 2020). ● Established in 2002, the Urban Forest Replenishment Fund is the primary funding source for grants and urban forestry related efforts such as maintenance and tree preservation. The Environmental Criteria Manual states “when all feasible mitigation efforts have been exhausted, and upon approval of the City Arborist, funds may be provided to the Urban Forest Replenishment Fund (UFRF) as part of the mitigation requirements” (Environmental Criteria Manual Section 3.5.4). ● The Planting for the Future Fund supports tree planting, maintenance, stewardship, and tree preservation with a focus on purchasing trees for planting. The fund consists of donations (City of Austin, 2020). ● The Austin Energy Urban Heat Fund is annually provided by Austin Energy for tree planting initiatives.
<p>Equitable Pathways to Green Careers</p>	<p>The Equitable Green Jobs Grant is a joint effort between the City of Austin Innovation Office, Equity Office, Sustainability Office, and Economic Development Department. The grant provides opportunities for BIPOC communities to gain valuable skill and work experience that prepare them to enter the green job industry. Currently, the grant awardees are focused on renewable energy (City of Austin, n.d.).</p> <p>The City of Austin’s Youth Forest Council is a year-long paid internship for local youth (16-19) that works with the city’s Urban Forest Program. Participants have the opportunity to plan events, create</p>

	<p>activities and collaborate on projects related to urban forestry and other natural areas within the city. There are no academic requirements to apply, and the program encourages young people from communities of color to apply (City of Austin, n.d.).</p>
Preventing Green Gentrification	<p>The City of Austin hired its first Displacement Prevention Officer, Nefertitti Jackmon, to oversee the Housing and Planning Department’s Displacement Prevention Division. Jackmon’s work will focus on community outreach and developing programs to prevent displacement in vulnerable communities, especially related to projects such as Project Connect, a large-scale transit plan in Austin. In 2020 Project Connection Proposition A (referring to Project Connect) was passed by voters which includes \$300 million in funding over 13 years for anti-displacement initiatives (City of Austin, 2021). Additionally, the city developed a Displacement Mitigation Strategy in 2019 to guide future work. Although this is not an example of green gentrification, Austin’s commitment to developing actionable strategies and creating a dedicated division is promising. A similar approach could be adapted to address green gentrification concerns within the city.</p>
Dedicated Committee/ Task Force	<p>Urban Forestry Board established by Austin City Code § 2-1-183 to oversee the development of an urban forest management plan for the city as well as advise or provide recommendations for the care and preservation of trees on public property. The board has seven members appointed by City Council and serve for three years (Urban Forestry Board, 2011).</p>
Clear Roles & Responsibilities	<p>Austin’s urban forest plan outlines tree-related responsibilities by city departments and breaks down programs and policies into five categories: regulation, planning, planting, maintenance, and education. Although the plan does not describe each program or policy in-depth, it provides a clear outline of departmental roles.</p>
City Maintenance of Public Trees	<p>The Public Works Department is responsible for maintaining right-of-way trees. Austin’s Code of Ordinances Title 6 defines the role of the Urban Forester to “supervise and coordinate with responsible city departments to plant, maintain, or remove trees on public property.” (Austin Code of Ordinances, Chapter 6-3).</p>
Collaborating Towards Common Goals	<p>Austin Energy has a Forestry Division that handles maintenance and pruning of trees that conflict with power lines. The division also coordinates with the City of Austin and TreeFolks on planting projects to reduce future conflicts with power lines (Austin Energy, n.d.).</p>
Promising Policies & Ordinances	<p>Austin has a few key tree protection, preservation, and care policies. The Urban Forest Plan highlights the significant tree related policies and ordinances within the city’s Land Development Code and Environmental Criteria Manual.</p> <p>Austin, TX -Land Development Code, Chapter 25-8, Subchapter B - Tree and Natural Area Preservation Ordinance. Notable sections include:</p> <p>Division 2. Protected Trees § 25-8-62: Prohibits the removal of protected trees unless the Planning and Development Review Department issues a permit. Exceptions are included.</p> <p>Division 3. Heritage Trees § 25-8-641: Prohibits the removal of heritage trees unless the Planning and Development Review Department issues a permit.</p>

	<p>Austin, TX - Code of Ordinances, Chapter 6-3. - Trees and Vegetation. Notable sections include:</p> <p>§ 6-3-65: Describes a cooperative agreement to plant trees where the urban forester may enter into an agreement with a nonprofit to plant trees on public property. Exceptions included.</p> <p>§ 6-3-75: Requirement to Replace a Tree. Outline the process for the replacement of a tree when removal is requested. Funds collected from failure to plant a replacement tree are deposited under the Planting for the Future Trust in Agency Fund to plant public trees.</p>
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Boise, ID - Boise has taken an innovative approach to effectively collaborate on urban forestry efforts. With the creation of the Treasure Valley Canopy Network, the city has implemented various tree planting initiatives to enhance this region’s community forest. Notably, the city is currently engaged with the City of Trees Challenge and the Treasure Valley Shade Tree Project. Boise is a semi-arid climate that faces drought conditions, making it an excellent case study for Denver’s future climate projections.

Partnerships	<p>The City of Boise has developed partnerships with The Nature Conservancy (TNC-Idaho) and Treasure Valley Canopy Network (TVCN) for the City of Trees Challenge. The Challenge aims to plant “one tree for every household in Boise and one seedling for every resident in Idaho forests by 2030” (Treasure Valley Canopy Network (TVCN), n.d.). The TVCN focuses on building effective partnerships with additional stakeholders, such as local nurseries, supply companies, and landscapers to enhance the impact of the Challenge and ensure its long-term success. As of now, 632 private and 1,759 public trees have officially been planted in Boise since the Challenge launched on Arbor Day 2020.</p> <p>TVCN also partners with the Idaho Power Company, Idaho Department of Lands, and the Arbor Day Foundation’s Energy Saving Trees Program for the Treasure Valley Shade Tree Project. The goal of this initiative is to provide shade to residents and to promote energy conservation in the summer months (Treasure Valley Canopy Network, n.d.). Idaho Power Company leads the funding for this project and analyzes energy savings for homeowners.</p>
Assessing Distribution	<p>In 2013, the Treasure Valley Urban Tree Canopy Assessment was completed by Plan-it Geo and funded by a US Forest Service Cooperative Forestry Landscape Scale Restoration grant. This UTC study examined land cover mapping data, UTC assessment, ecosystem services analysis, and provided scenario planning tools (Plan-it GEO, 2013). Based on the results of the assessment, priorities, and strategies for enhancing Treasure Valley’s community forest were designed.</p> <p>The 2017 Treasure Valley Forest Carbon Assessment analyzed the community forest’s potential to mitigate the impacts of a changing climate (Davisson et al., 2017). This report quantifies ecosystem services using protocols developed by City Forest Credits.</p>
Equity Performance	<p>The city’s impact certification by City Forest Credits certifies that Boise’s City of Trees Challenge is designed to increase healthy, equitable, and science-based outcomes through their Impact Framework</p>

Metrics/ Indicators	(City Forest Credits, 2021). City Forest Credits partners with local operators, businesses, local non-profits, and/or government entities to design a project that meets the community’s needs. The Impact Scorecard quantifies the potential impact of a designed project by analyzing 5 themes and 90 indicators. The City of Trees Challenge tracks the success of their tree planting initiatives utilizing GIS software. For every new tree planted and registered, the geographical location gets tracked.
Social Equity in Urban Resilience Planning	Boise has implemented an equity framework through their ‘A Clean City for Everyone’ report that highlights community environmental and health equity assessments, diversification of representation, ensuring equal access to engagement and city services, eliminating racially restrictive covenants from home ownership documents, environmental health impacts, and addresses the impacts of poor air quality for underserved communities (City of Boise, 2020). Moreover, the report provides recommendations for equity, engagement, and public health through effective resilience and climate planning. Tree canopy is listed as an indicator for climate resilience and the report recommends a UTC spatial distribution assessment to identify vulnerable communities. In the 1-year goals, the report lists: <ul style="list-style-type: none"> ● Begin targeting tree planting to expand canopy cover in specific neighborhoods. ● Evaluate and strengthen existing tree ordinances.
Funding	Through Boise’s effective partnerships with various stakeholders, the community forest has received various forms of funding. <ul style="list-style-type: none"> ● Arbor Day Grants: In partnership with Idaho Department of Lands, Idaho Nursery and Landscape Association, Avista, Idaho Power, and Rocky Mountain Power, small grants are offered to celebrate Arbor Day in communities throughout Idaho (Idaho Department of Lands, 2021). ● TVCN & Partners: The various partnerships included in the TVCN helps provide funding for urban forestry efforts throughout the Treasure Valley region. ● Community Development Block Grants: is a flexible program that provides communities with resources to address a wide range of unique community development needs, including projects and activities that focus on low- to moderate-income households (City of Boise, 2021).
Clear Roles & Responsibilities	The 2015 Community Forestry Strategic Management Plan lists the Community Forestry programs, staffing and responsibilities, and collaboration with key stakeholders (City of Boise, 2015, p. 11-13). The Plan highlights the need for clear collaboration between internal and external stakeholders to sustain the community forest (City of Boise, 2015, p.13). A key strategy to Boise’s community forestry plans are to partner with PDS, CCDC, ACHD, and DBA to develop and implement a funding plan for maintenance of downtown trees, including irrigation, establishment, protection and pruning.
City Maintenance of Public Trees	<ul style="list-style-type: none"> ● The City of Boise is responsible for the removal of dead, diseased, or hazardous trees from public rights-of-way at no cost to the adjacent homeowner. If it is not warranted, the removal will not be permitted. If a homeowner feels removal might be warranted, they can call the Boise Community Forestry for a free inspection of the tree. When a street tree has been designated for removal, a public notice will be posted on that tree. This provides an opportunity for questions and comments. ● The City of Boise’s Community Forestry staff is responsible for maintaining all public trees.

<p>Collaborating Towards Common Goals</p>	<p>To sustain the urban forest on private and public lands, Boise’s Community Forestry staff emphasizes their collaboration with the City of Boise Public Works, City of Boise Planning & Development Services, Ada County Highway District (ACHD), Capital City Development Corporation (CCDC), Downtown Boise Association (DBA), Idaho Power Company, Neighborhood Associations, homeowners, business owners, developers, tree care, nursery & landscape nurseries (City of Boise, 2015). Furthermore, the TVCN assists with coordination efforts and promotes external collaboration. By leveraging various forms of networks and having executive leadership that supports collaborative goals, various tree planting initiatives and green infrastructure projects have successfully been implemented in Boise.</p> <p>The City of Boise took an innovative and collaborative approach to implementing green infrastructure into their planning processes. TVCN led a partnership with the city’s urban forestry division, planners, and construction companies to resolve their long-standing challenges with efficient stormwater management. Boise previously struggled to grow trees when they were planted in 4’ by 4’ wells (DeepRoot, n.d.). The lack of soil resulted in poor health and long-term damage due to extremely hot and dry summers. This partnership led to the use of suspended pavement systems, such as Silva Cells. Silva Cells allow trees to grow larger and treat rainwater on site. Over 100 trees have been planted in Silva Cells in Boise, totaling 100,000 cubic feet of soil, which will nurture their long-term growth and provide runoff reduction and improved water quality. The CCDC, the city, and the Ada County Highway District (ACHD) built the use of suspended systems into the city’s construction standards (DeepRoot, n.d.).</p>
<p>Climate Resilience</p>	<p>Boise, Idaho’s semi-arid climate poses irrigation challenges for the maintenance of the urban forest. To address these concerns, a study was conducted by the Conservation Economics Institute for Idaho River United in partnership with Ada County Highway District, City of Boise, Garden City, Drainage District #3, Idaho Transportation Department, and COMPASS to determine the cost-benefit analysis of utilizing green infrastructure (Hjerpe & Adams, 2015). To improve water quality in public waters, permit #IDS-027561 encourages the Boise area to utilize green stormwater infrastructure (GSI), such as bioretention areas, tree systems, and permeable pavers. They state, “Mimicking natural conditions can lead to substantial avoided costs” (Hjerpe & Adams, 2015). The report emphasizes the need to evaluate social benefits as well as ecosystem services when considering the cost-benefit analysis of green infrastructure.</p>
<p>Promising Policies & Ordinances</p>	<p>Boise Tree Ordinances Chapter 2 Section 7:</p> <p>§ 7-2-5: City Forester manages and regulates the planting, maintenance, and management of all city owned trees. Adjacent property owners are responsible for tree maintenance.</p> <p>§ 7-2-11: makes it unlawful to damage or destroy any public tree.</p> <p>§ 7-2-14: compensatory payments are required for any person who removes, damages, or destroys any public tree. Compensation must match the equivalent dollar amount of the tree value.</p>

	<p>§ 7-2-15: Penalty or failure to comply with the City Forester results in a misdemeanor. Additionally, the City can “pursue civil penalties and restitution for actual damages as set forth in section 7-2-14 of this chapter. (1952 Code § 9-16-12)” (Boise, ID Code of Ordinances, 2021a)</p> <p>Boise Development and Design Standards Chapter 11-07 Provides technical knowledge on design standards and requirements. Consistently incorporates the preservation of trees in new designs, stating that construction is required to enhance aesthetics. Provides minimum plant sizes (Table 11-07.6) and required number of trees/species diversity (Table 11-07.7). Trees are required for stormwater management purposes, such as Street Buffers and Swales (Boise, ID Code of Ordinances, 2021b).</p>
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Cincinnati, OH - Touted as one of the most successful urban forestry management programs in the country as well as one of the leaders in grassroots climate change work, Cincinnati, OH exhibits many promising policies and practices, especially around community engagement. In terms of their equity work, one big gap that needs to be aired out more is if there are accountability measures for the equity work the city does list, i.e., just because they state a goal and have a designated person attached to it, is work actually being done around it? Interestingly, the City does not seem to have an urban forest master plan; however, urban forestry is interwoven into many, many of the City’s plans.

Partnerships	Around urban tree equity, the City of Cincinnati’s Office of Environment and Sustainability (OES) has just partnered with Groundwork Ohio River Valley (ORV) to work together to advance equity within the city’s green future — strengthening both the City’s 2018 Green Cincinnati plan as well as Groundwork ORV’s Climate Safe Neighborhoods project (<i>City of Cincinnati and Groundwork Ohio River Valley Awarded National Climate Grants</i> , 2020). Climate Safe Neighborhoods is a Groundwork USA project that looks into the relationship between redlining and current and future impacts of climate change. The program also seeks to bring together and mobilize residents and stakeholders in order to help make these places more resilient to climate risks (Groundworks Ohio River Valley, n.d.).
Assessing Distribution	Every 10 years, the City of Cincinnati undergoes an Urban Tree Canopy Assessment that combines GIS canopy distribution data with census data. This assessment guides the City with management decisions as well as where new trees should go based off of canopy cover. Additions to the assessment were incorporated in 2020 to include fine particulate matter and urban heat island measurements (Urban Land Institute, n.d.).
Equity Performance Metrics/Indicators	In the summer of 2020, Cincinnati came out with a Heat Watch report aimed at providing information on the distribution of temperature and humidity across the area. As part of their “Next Steps”, the report calls on using publicly available data on sociodemographics and land use to see where expanding tree canopy can have direct benefits on the mitigation of UHI (Monks, 2020).
Social Equity in Urban Resilience	Lots of work around incorporating community voices within the urban tree canopy / city planning is being done through Groundwork ORV through the Climate Safe Neighborhoods program

<p>Planning</p>	<p>(Groundworks Ohio River Valley, n.d.). In an interview with Carla Walker, the previous Climate Advisor, City of Cincinnati at NRDC, she told the MENV team how Groundworks ORV hosted six community workshops where they directly asked community members <i>where</i> they wanted to see trees in their community, letting them draw exact locations on a map and collaborate with other community members. Carla said some maps might get developed into a climate strategy. She also said residents can take that information they learned and the maps and use it to have conversations with new city council members, helping to show that they know what’s lacking, what the dangers are, solutions, locally developed adaptations, and strategy plans.</p> <p>Specifically, through the City government, Cincinnati has an Energy Equity program that, “provide[s] efficiency upgrades, energy educational experiences, and financial assistance and incentives to residents and building owners in Cincinnati” (City of Cincinnati, n.d.).</p>
<p>Funding</p>	<p>Cincinnati’s urban forestry program has been in place since 1981 and is funded by an annual assessment on the footage on a right-of-way. Every property owner annually pays \$0.21 per front footage of property, generating over \$2 million annually for the program.” (Urban Land Institute, n.d.)(Davey Resource Group, 2015). Additionally, the 2018 Green Cincinnati Plan called for the creation of a Carbon Offset program to fund tree planting efforts. The program would allow for individuals and businesses to calculate their carbon footprint and voluntarily buy trees to be planted to offset their footprint (City of Cincinnati, 2018). In an interview with Crystal Courtney, the Urban Forestry Supervisor at the Cincinnati Park Board, on 7/21/2021 she confirmed the program was implemented and it’s been running for the past six months.</p>
<p>Equitable Pathways to Green Careers</p>	<p>Cincinnati lists in their 2018 Green Cincinnati Plan that one of their “keys to equity” in achieving their goal of increased tree canopy and access to green space is to provide jobs to incarcerated individuals and members of work release programs, providing useful work skills (City of Cincinnati, 2018). Unfortunately, Crystal Courtney during the 7/21/2021 interview stated no work has been done with this specific goal.</p> <p>The City of Cincinnati has, however, partnered with Groundworks ORV to implement a pilot project that helps underserved youth gain experience in green careers. More information on this will come after a full year of the project, Crystal told the team during the interview.</p>
<p>Dedicated Committees/ Task Forces</p>	<p>Cincinnati’s municipal code lists that they have an Urban Forestry Advisory Board under Sec. 743-3 “whose duty it shall be to advise the director on the establishment of appropriate urban forestry programs, regulations, and the planning, promotion and guidance of the urban forestry program”.</p>
<p>Clear Roles & Responsibilities</p>	<p>Within Cincinnati’s Green Plan, each section with a goal has a section around who will be taking the lead on the project. This includes other government agencies, non-profit organizations, and private sector players (City of Cincinnati, 2018). Oliver Kroner, the City of Cincinnati’s Sustainability Coordinator, said during an interview with the MENV students that this was done through a steering committee (appointed by the mayor consisting of institutional figureheads) picking the top 80 carbon drawdown goals for the City. They then asked different groups and organizations (governmental,</p>

	non-profit, private) to choose which goals best align with their work. Accountability measures for these roles and responsibilities, however, are currently unknown.
Collaboration Towards Common Goals	While the City of Cincinnati does not have an urban forestry master plan, forestry is incorporated in many of their plans. As mentioned above, the City is looking at incorporating urban tree canopy to help combat their urban heat issue. Also mentioned, the City is pairing urban tree canopy goals with their 2018 Green Cincinnati plan to reach their sustainability and GHG goals.
City Maintenance of Public Trees	Control, planting, care, and maintenance of shade trees paid for through an annual levy (Urban Land Institute, n.d.). Every street tree is inspected and maintained, if necessary, at least every six years. Roughly 12,000 trees are inspected in a typical year (Trombly, 2017).
Ordinances	Reference funding and maintenance. Revised Code 727. Also, reference Cincinnati’s municipal code chapter 743, which deals exclusively with urban forestry.

Miami Beach - In October 2020, the city adopted its first urban forestry master plan that was developed through the lens of climate adaptation and resilience. The first section of the plan outlines the current state of Miami Beach with assessments of tree inventory, canopy distribution, stakeholder engagement efforts, and standing policies and practices related to urban forestry initiatives. It also provides the city’s target to “achieve 22% tree canopy cover city-wide by 2040,” as well as other goals, recommendations, and next steps to achieving a climate resilient and more robust tree canopy. The second section of the plan is an “Urban Canopy Toolbox” which details tools to help government officials, contractors, and developers with the implementation of the items outlined in the first section of the plan.

Assessing Distribution	The City of Miami Beach conducted an urban heat island analysis to understand the impacts of impervious surfaces and temperatures on the city and pinpoint the area where city resources and outreach on tree planting and maintenance are most needed. The analysis modeled the surface temperature of Miami Beach during one of the city’s hottest months in August which allowed the city to identify where surface temperatures were highest and the urban heat island effects were the greatest. While the city as a whole is experiencing warm temperatures in August, areas in North Beach and South Beach are shouldering the greatest urban heat island burdens, including respiratory difficulties, heat stroke, and heat-related mortality (City of Miami Beach, 2020).
Equity Performance Metrics/ Indicators	Within the urban forest master plan, the city committed to identifying metric(s) to measure equity in tree canopy distribution, such as rental vs. owner-occupied, median household income, tree benefits per capita, urban heat island index, and human health indicators. The analyses will be conducted by overlaying the equity metric GIS layers with the urban tree canopy layer (City of Miami Beach, 2020).
Social Equity in Urban Resilience	One of the goals of the urban forest plan is to develop canopy cover targets and tree planting or preservation plans in areas that are below the city-wide neighborhood canopy cover average of

Planning	15%. To achieve this, the city will conduct a tree canopy equity analysis to prioritize outreach and tree planting efforts where tree canopy is not equitably distributed.
Funding	<p>Miami Beach’s urban forestry division utilizes the following sources of funding for tree care, planting, and landscape maintenance activities:</p> <ul style="list-style-type: none"> ● Miami Beach General fund ● Tree Trust Fund (Generates revenue from tree permit plan review fees, inspection fees, code violations, fines, contributions, and mitigation.) ● Donations from the Commemorative Tree program ● State of Florida Urban and Community Forestry grants (City of Miami Beach, 2020).
Clear Roles & Responsibilities	<p>According to the master plan, three divisions within the City of Miami Beach are responsible for tree care, maintenance, and management. The Environment and Sustainability Department Regulatory division is responsible for overseeing tree permits, ordinance enforcement, private development plan reviews and internal/external project coordination. The Public Works Department is in charge of landscape maintenance in medians, parking lots, coastal areas, non-park city facilities, and select rights-of-way. The Parks & Recreation Department leads managing and maintaining the city’s park system. Parks Maintenance oversees contractors that perform all routine landscape maintenance, including tree maintenance. Each division also has International Society of Arboriculture certified arborists on staff and actively coordinate and collaborate on urban forestry activities.</p>
City Maintenance of Public Trees	<p>The City of Miami Beach must maintain trees and palms growing in city parks and along a limited number of street rights-of-way/swales, but the primary responsibility of tree maintenance in the public rights-of-way and those on private property falls on adjacent private property owners. This has often led to improper maintenance, unnecessary tree removals and instances of harm to trees (City of Miami Beach, 2020). To correct this practice, the urban forest plan describes a pathway towards a proactive tree maintenance program and the transfer of all right-of-way/swale tree maintenance responsibility to the city. The plan calls for Parks and Recreation (with support from the Urban Forestry Division) to establish a three-person City Parks crew dedicated to tree care and emergency tree maintenance. Additional maintenance efforts, as noted in the plan, should include continuing to contract out tree maintenance, care, and removal activities separately from litter removal and other landscape maintenance services to ensure that proper care and attention is given to trees specifically.</p> <p>The plan also identifies another critical goal to track and report on tree care, planting, and maintenance activities that are to be completed annually. GIS-based tree/asset management software systems like TreeKeeper, Cityworks, PubWorks can be used to manage, track, and report on tree maintenance and planting activities. The plan notes that hiring an intern in the Urban Forestry Division can create the capacity needed to enter data from tree permit applications and private development projects into software systems.</p>

Collaborating Towards Common Goals	<p>The urban forest plan indicates that though City departments and divisions are strongly encouraged to collaborate and coordinate, the Urban Forestry/Greenspace Management/Park Maintenance may not always do so, and tree damage or removal that is avoidable can often occur. In some instances, engagement between departments may occur, but the priorities of the project may run counter to urban forestry goals. According to the plan, a review of select city master plans, studies and policies was conducted to evaluate the influence that each will have on the urban forestry master plan. Studies, plans and policies that ranked highest include the 2010 Sustainability Plan, Urban Forestry Division Policies and the 2018 Green Infrastructure Center’s urban tree canopy and stormwater study (City of Miami Beach, 2020).</p>
Climate Resiliency	<p>Miami Beach’s iconic palm tree species constitute more than 55% of the public tree population, far exceeding the 30% guideline. The lack of public tree diversity makes existing trees vulnerable to disease, pests and interferes with the benefits that urban trees provide. The urban forest master plan outlines the target that palms should make up no more than 25% of the public tree population by 2050 and calls for moratoriums on certain palm or other tree species “that are above the 10-20-30 diversity rule (City of Miami Beach, 2020).</p> <p>In the development of the Master Tree and Palm Palette list for the City’s urban forester, various criteria were considered in the selection. These consider the factors needed to ensure that selected trees and palms have the greatest chance of survival within Miami Beach. By focusing on these more extreme conditions in the City, a list can be developed that can serve both the areas of highest constraints (e.g., multi-family areas and the commercial and hotel use corridors) as well as those areas more conducive to the growth of trees (e.g., single-family home use areas). The following criteria were used to evaluate the likeliness of tree adaptability and resilience:</p> <ol style="list-style-type: none"> 1. Drought and Urban Heat Island Tolerance 2. Leaf or Fruit Litter 3. Maintenance Required 4. Overall Longevity 5. Resilience to Relocation 6. Root System Characteristics 7. Salt Tolerance 8. Shade Cast 9. Storm and High-Wind Tolerance 10. Tolerance to Crown-Raising
Promising Policies & Ordinances	<p>The City of Miami Beach’s Code Compliance Division works with the Urban Forestry Division to enforce city codes related to tree protection and preservation; however, Code Compliance is responsible for enforcing all city codes and tree care and preservation violations are not currently a high priority (City of Miami Beach, 2020).</p> <p><i>City of Miami Beach Relevant Ordinances</i></p>

	<p>Chapter 46, Division II: A comprehensive tree preservation ordinance that includes goals to promote canopy cover, increase species diversity, and tree preservation and align with the goals, recommendations and next steps listed in the urban forest master plan.</p> <p>Chapter 126, Section 126-5: The code maximizes the number of trees that can be planted by requiring a maximum average spacing of 20 feet. While the tree planting requirements allow palms to be planted, they cannot be counted towards meeting the required number of trees on site. This encourages residents, developers, and businesses to plant more shade trees. The code also requires a minimum of 2 lot trees to be planted within the “energy conservation zone” of a lot. This encourages the planting of trees to shade buildings and provide the maximum energy savings.</p>
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New York City - The Forest for All NYC in June 2021 released the NYC Urban Forest Agenda with the goal of achieving 30% canopy cover by 2035 in “a way that is equitable and just” (Forest for All NYC, 2021). The agenda seeks to create an urban forest master plan and to develop careers in urban forestry. It also aims to strengthen tree regulations, establish incentive programs, and set up wood waste reuse projects. The coalition notes that trees on public or private property are not legally protected in NYC and that public funding is currently inefficient or dedicated to temporal government initiatives like MillionTreesNYC.

Partnerships	<p>The NYC Urban Forest Agenda united 50 diverse organizations dedicated to enhancing the urban forest, ranging from the New York City Department of Parks and Recreation to the New York City Environmental Justice Alliance, the New York City Housing Authority, and the Real Estate Board of New York. Informed by the distinct perspectives of these different organizations, the agenda is a shared vision that can help shape strategic planning, maintenance and management, investment, learning, research, and policy for the city’s urban forest. The agenda emerged from the urgent climate, equity, and sustainability issues facing the city that intersect across the interests of each partner organization (Forest for All NYC, 2021).</p>
Social Equity in Urban Resilience Planning	<p>Fairer distribution and equitable access to the benefits of the urban forest are central pillars of the NYC Urban Forest Agenda. The agenda supports the development of community-scale urban forest plans and goals in order to avoid the pitfalls of the MillionTreesNYC initiative that failed to strategically target the areas that are in most need of tree canopy and furthered tree inequity instead (Garrison, 2019). The Forest For All NYC coalition, Community Districts, and community members will integrate community-led forestry efforts into local planning processes and co-create related goals for each of the 59 Community Districts and five boroughs. Such goals must consider current tree cover needs, local geography, the needs or concerns of the community, and tree survival rates in designated areas. Giving communities shared ownership may allow for a more comprehensive look at the characteristics of a community and can provide additional capacity for identifying areas with high or low potential for tree planting (Forest for All NYC,</p>

	2021). This approach can help balance meeting the needs of the community as well as climate and sustainability city-wide goals.
Assessing Distribution	Apart from the MillionTreesNYC and Cool Neighborhoods NYC initiatives, the city does not have an overarching plan, vision, or goals related to its urban forest. To address this gap, the NYC Urban Agenda highlights the need for “tangible, specific, and measurable goals and targets that transcend government administrations...” and that are rooted in climate resiliency and distributional equity (Forest for All NYC, 2021).
Funding	Funding for urban forestry initiatives has been historically contingent on temporal government initiatives that change with mayoral administrations (Forest for All NYC, 2021). To combat this, the Forest for All coalition is slated to launch a campaign for a dedicated multi-year city budget commitment for urban forestry projects such as monitoring and routine assessments. The campaign will also create a grassroots advocacy training program to increase capacity of local organizations to lobby for public and private funding, as groups from underserved communities tend to lack adequate funding to start or continue tree stewardship activities due to the lack of grants available to small community groups or unequal access to advocacy training. According to the agenda, the distribution of funds will be grounded in justice, equity, diversity, and inclusion.
Equitable Pathways to Green Careers	The agenda identifies expanding urban forestry career and leadership opportunities as a way to advance equity and a Just Transition in communities that are underemployed and most vulnerable to the impacts of climate change. Such opportunities will be expanded through partnerships with higher-education institutions to create urban forestry-specific degree and certificate programs and advocacy around urban forestry positions that pay livable wages and are year-round. Currently, there are no forestry degree programs at any of the City University of New York institutions (Forest for All NYC, 2021). This practice will increase the diversity of the urban forest workforce and ensure that tree care professionals are able to acquire the technical qualifications needed to enter the field.
Dedicated committed coalition/task force	The Forest for All NYC coalition includes partners from various sectors that will provide allotted time and space to plan and implement the actions outlined in the NYC Urban Forest Agenda. The purpose of the coalition will be to hold groups accountable on achieving the agenda’s commitments, identifying emerging priorities, and getting other relevant stakeholders to the table. This dedicated coalition can remedy capacity concerns and ensure sustained progress on the agenda.
Collaborating Towards Common Goals	Given that NYC does not have any formal urban forestry plans, the creation of an urban forest master plan is a key action outlined in the NYC Urban Forest Agenda. Developing a master plan will help integrate trees into other NYC plans, including the Streets Master Plan, Comprehensive Waterfront Plan, Climate Resiliency Design Guidelines, and the pending Environmental Justice Plan. A Master Plan will increase visibility, help galvanize public interest and engagement, and

	allocate more funding toward needed urban forestry projects, particularly to environmental justice and climate-vulnerable neighborhoods
City Maintenance of Public Trees	Within the 2018 Forest Management Framework – a joint project of the non-profit Natural Areas Conservancy (NAC) and the New York City Department of Parks and Recreation (NYC Parks) – is a comprehensive “staffing vision” to carry out forest monitoring and maintenance efforts. The vision states that publicly funded staff from NYC Parks, privately funded staff from NAC, and volunteers will fill these roles and outline proposed positions and the type of work needed to implement these areas of the plan (Natural Areas Conservancy, 2019).

Pittsburgh, PA- A city that’s brought up equitable tree canopy since as early as 2012, Pittsburgh shows lots of promising practices and policies around equitable urban forestry. Their 2012 urban forestry master plan was the result of high collaboration between government, non-profit, and private sector groups. Additionally, Pittsburgh has found many unique ways to go about funding their urban forestry programs (although funding was still a point of need in an interview with Danielle Crumrine, Tree Pittsburgh’s Executive Director). One of the City’s strengths, as voiced by Danielle, is their data.

Partnerships	<p>The City partners heavily with Tree Pittsburgh, a local non-profit dedicated to “enhancing community vitality by restoring and protecting the urban forest through tree planting and care, education, advocacy, and land conservation” (Tree Pittsburgh, n.d.).</p> <p>The City also is a partner in TreeVitalize, a state-funded, public-private partnership program in Pennsylvania established by the Department of Conservation and Natural Resources to help communities plan, plant, and care for trees (Pennsylvania Department of Conservation & Natural Services, n.d.).</p>
Assessing Distribution	The Spatial Analysis Laboratory (SAL) at the University of Vermont’s Rubenstein School of the Environment and Natural Resources carried out the Tree Canopy Assessment in collaboration with Allegheny County, Tree Pittsburgh, and the Pennsylvania Department of Conservation & Natural Resources. Funding was provided by Allegheny County and the USDA Forest Service (O’Neil-Dunne, 2012).
Equity Performance Metrics/Indicators	In Pittsburgh’s Urban Forest Master Plan, it calls for an increase in overall urban canopy from the 42% they are at currently to 60% by 2032. Tree Pittsburgh, a non-profit and a lead partner who helped develop the plan, states, “To better work with the unique challenges that exist in Pittsburgh’s diverse regions, Tree Pittsburgh is focused on working with communities to create neighborhood-level urban forest master plans. The goal is to increase tree canopy cover and engagement on a localized scale by planting more trees and ensuring their care” (Tree Pittsburgh, n.d., <i>Neighborhood Initiatives</i>).
Social Equity in Urban	The Equitable Street Tree Investment Strategy (please reference the Maintenance section below for further detail).

Resilience Planning	
Funding	<p>Pittsburgh has a few modes of funding for different programs and efforts:</p> <ul style="list-style-type: none"> ● <i>Shade Tree Commission (Shade Tree Commission, n.d.)</i> (commission to be discussed in further detail below) - A quasi-governmental entity tasked with “making recommendations to City Government to restore and maintain the city’s tree population” — is funded through the Outdoor Advertising Excise Tax and the Alternative Compliance Fund. The Outdoor Advertising Excise Tax — a response to Pittsburgh’s inundation of billboard advertising — is a 10 percent tax on billboard sales, rentals, and licenses in the city (money from this tax, however, seems to be in a continuous battle in the courts) (Worthy, 2019). The Commission receives money from the Alternative Compliance Fund when developers are unable to meet street tree requirements. ● <i>TreeVitalize</i> - TreeVitalize Pittsburgh is made possible due to this program and has planted 33,000 trees since 2008 (Pennsylvania Department of Conservation & Natural Services, n.d). TreePennsylvania, the Pennsylvania Urban and Community Forestry Council, is in charge of administering the TreeVitalize grants throughout the state. Additional funding for this program also comes from the state’s Keystone Tree Fund, a voluntary \$3 check-off box on Pennsylvania driver’s license and vehicle registration online applications. In January of 2021, the Keystone Fund raised \$23,000 towards tree planting efforts. The Fund also accepts direct donations (Pennsylvania Department of Conservation & Natural Resources, 2021). ● <i>Reforestation Hub</i> - A pilot program through the partnership of Cambium Carbon and the Arbor Day Foundation aimed at helping cities finance urban forestry initiatives through wood reuse of fallen city trees and potentially the sale of carbon credits (City of Pittsburgh, 2021, January 4) (Hopey, 2021).
Dedicated Committee/ Task Force	<p>The City of Pittsburgh’s Shade Tree Commission (listed earlier in the Funding section) includes Mayor-appointed and City Council-approved volunteers who approve recommendations to the mayor’s office and City Council on utilizing funds from the Shade Tree Trust Fund to advance urban forestry initiatives. The committee has 15 members, consisting of city officials and various institutions and organizations. This committee can be found under Pittsburgh’s code of ordinance chapter 487, Ord. 23-1998.</p>
Clear Roles & Responsibilities	<p>In the interview with Danielle Crumrine, she informed the team that Tree Pittsburgh was created by the city to specifically take care of things such as taking on the care of the trees, the fundraising, engaging with the community, and so on. Additionally, Pittsburgh has many and strong partnerships around urban forestry as shown above in the funding section (TreeVitalize, Tree Pittsburgh, and the City).</p>
Maintenance	<p>In March of 2021, Mayor William Peduto and the City’s Shade Tree Commission introduced a new Equitable Street Tree Investment Strategy that will help equitably implement Peduto’s 100,000 tree vision over the next decade. The strategy was created in order to promote and fund maintenance and tree care, support education, and increase awareness of urban forestry benefits in 10 low-income neighborhoods with low tree canopy cover (WPXI News, 2021). The plan has four phases, with phase</p>

	<p>four being to “identify the next 10 neighborhoods for investment,” showing how the City hopes to continue on with maintenance assistance to more and more neighborhoods as the strategy is implemented (City of Pittsburgh, 2021, March 2)</p> <p>Additionally, Tree Pittsburgh has a Tree Tender volunteer program that teaches local residents how to care for trees (Tree Pittsburgh, n.d., Volunteer)</p> <p>Danielle Crumrine told MENV students in an interview that there is a policy and practice to never plant a tree without a two-year maintenance plan established, whether it be school, street, or private.</p>
<p>Collaborating Towards Common Goals</p>	<p>Increasing tree canopy is listed many times throughout the City of Pittsburgh’s Climate Action Plan (City of Pittsburgh, 2018). Pittsburgh’s urban forest is also mentioned in their Resilient Pittsburgh plan, with collaboration in the City’s goal of wanting to provide opportunities for community service and volunteer with opportunities such as the Tree Tenders and TreeVitalize (City of Pittsburgh, 2017).</p>
<p>Ordinances</p>	<p>Ch. 483 - Care & Maintenance; Ch. 487 - Shade Tree Commission; Ch. 485 - Damage (the person who damages a public tree must pay fee); Ch. 918.02.C - Street Trees (Ord. 42-2005, §§ 28, 29) - For new buildings, a street tree must be planted every 30 feet.</p>

Portland, OR - Portland has consistently demonstrated promising practices for progressing green initiatives into their city’s planning processes. Portland was also one of the first cities to integrate an equity component into their urban forestry plans. However, the city has been identified as a city leading the country in UTC distribution disparities. Nonetheless, Portland is making significant strides to address these concerns through their equitable tree planting initiative.

<p>Partnerships</p>	<ul style="list-style-type: none"> ● Portland partners with the Friends of Trees non-profit organization which consists of tree planting programs that are designed to help the environment and bring people together (Friends of Trees, 2021). The organization provides street and yard trees that cost \$35 each to make it more affordable for all residents. Volunteers provide a 6-foot-tall tree from local wholesale tree farms, then assist with planting and maintenance (Friends of Trees, 2021). Additional programs include natural area restoration, education and job training, watering, pruning, mulching, and monitoring of urban trees. ● Portland’s Neighborhood Tree Teams work with the city’s Urban Forestry division on the community level to plan educational workshops, tree walks, or tree stewardship activities such as pruning or planting (City of Portland, 2021a). This group also advocates for community trees at neighborhood association meetings and acts as a connection between residents and the Urban Forestry agency. In addition, community members can reach out to Urban Forestry staff to learn about opportunities, such as tree plantings, tree giveaways, pop-up arboreta, local tree care projects, community outreach and more. Furthermore, their website provides educational materials and information regarding funding sources for various types of tree stewardship activities (City of Portland, 2021a). ● The Neighborhood Tree Steward Program collaborates with community partners, such as Friends of Trees, Depave, Bureau of Environmental Services Tree Program, and the Office of Neighborhood Involvement (City of Portland, 2021a). ● Portland is accredited by the Arbor Day Foundation as a Tree City USA, a Tree City of the World, and won the Tree City USA Growth Award due to the city’s commitment to effective urban forestry management. Notably, Portland’s volunteers dedicated the most hours out of any city in the US and are 2nd in global rankings in the Tree Cities of the World program (City of Portland, 2021b).
<p>Assessing Distribution</p>	<p>Portland strives to connect community members with their urban forest through their street tree inventory project. Since 2010, volunteers have mapped, measured, and identified nearly 250,000 trees in Portland’s streets and parks (City of Portland, 2021c). On their website, they provide a user-friendly GIS map that allows residents to search their neighborhood and determine the number of trees that have been inventoried. Due to the COVID-19 pandemic, the inventory project has been put on pause and is set to resume in the summer of 2022 (City of Portland, 2021c).</p> <p>The 2017 city-wide street tree inventory report provides data on the urban forest structure, tree condition, planting sites and stocking level, and the urban forest’s value and benefits (Portland Parks and Recreation, 2017). This data reports tree inventory data that was obtained by volunteers and urban forestry staff between 2010 - 2016. Key findings were a lack of diversity in tree species, not</p>

	<p>enough evergreens used in the urban area, not enough mature trees in the public right-of-way, and only 20% street trees are from large varieties (Portland Parks and Recreation, 2017). Another notable assessment was examining the uneven distribution of suitable planting sites available in different neighborhoods. This poses limitations for enhancing canopy in this area, and planting on private property may be the only option if creative expansion is not feasible (Portland Parks and Recreation, 2017).</p>
<p>Equity Performance Metrics/ Indicators</p>	<p>In accordance with our interviews, the City of Portland tracks the geographical location of street trees and overlays this data with race and socioeconomic data using arcGIS software. Additionally, the city engages with the community and surveys their feedback on their tree planting strategy. Performance indicators are incorporated into future planning processes, which is demonstrated in the city’s equitable tree planting strategy documentation (Portland Parks and Recreation, 2018).</p>
<p>Social Equity in Urban Resilience Planning</p>	<ul style="list-style-type: none"> ● In the 2004 Urban Forestry Management Plan, one of Portland’s main objectives is to provide equitable urban forest benefits for all residents of the city (Portland Parks and Recreation, 2004). The City shares an annual report that establishes near and long-term urban forestry goals starting in 2007. This Action Plan established equitable street tree distribution as an outcome of Goal 3 (Portland Parks and Recreation, 2007, p. 17). Early priority actions included targeting communities that have lower canopy and lower income neighborhoods for street tree planting initiatives (Portland Parks and Recreation, 2007). ● The 2020 Annual Action Report still aims to enhance the equitable distribution of trees and lists how their programs have contributed to this goal (Portland Parks and Recreation, 2021). ● The City’s Office of Equity and Human Rights developed a Racial Equity Toolkit that ensures government actions and decisions are designed to achieve truly equitable outcomes (City of Portland Office of Equity and Human Rights, 2017). The toolkit also identifies progress on racial equity initiatives and determines how the success of these programs will be tracked and measured over time. ● The ‘Growing a more equitable urban forest: Portland’s citywide tree planting strategy’ was developed after performing community outreach, “including feedback from Community Advisory Committee members and culturally-specific focus groups” (Portland Parks and Recreation, 2018). This strategic plan acknowledges that Portland’s distribution of trees is unequal and linked to socioeconomic factors. Portland Parks and Recreation also partnered with Portland State University to identify barriers, opportunities, and recommendations for growing a more equitable urban forest (Portland Parks and Recreation, 2018). This document outlines the key findings and recommendations that resulted from the project’s outcomes. Notable highlights: (i) acknowledgement of the barriers that inhibit progress for equity in urban forestry. These fears and challenges can be addressed through engagement from government entities. (ii) when engaging with underserved communities, government entities should integrate culturally specific considerations, such as translation and interpretation services, culturally relevant events, and allow for flexibility/adaptability for existing

	<p>volunteer programs to include specific communities. (iii) community members want to play an active role in the planning and maintenance of the urban forest - “67% of surveyed respondents believe that the city should maintain street trees in the right of way and 74% believe the city should prioritize street tree maintenance in lower-income areas”. (iv) additional considerations include addressing cost barriers, creating jobs for local residents, advocating for trees at rental properties, and building trust with community members (Portland Parks and Recreation, 2018).</p> <ul style="list-style-type: none"> ● Portland Parks & Recreation (PP&R) hosts Yard Tree Giveaways that offers free trees for residents that live in low-canopy communities or lower-income neighborhoods in East Portland. In 2020, they gave away 760 trees for residents' yards that will be regularly visited by urban forestry staff to ensure survival and monitoring (Portland Parks and Recreation, 2021). ● The City of Portland’s 2021 Federal Legislative and Regulatory Agenda looks to create opportunities for brownfield remediation in underserved communities by expanding U.S. Environmental Protection Agency grants, create a federal anti-displacement program to provide “programmatic funding to stabilize households” and to mitigate the risk of gentrification, obtain federal funding for urban parks in low-income neighborhoods that lack adequate access to greenspace, and invest in the U.S. Forest Service’s Urban and Community Forestry Program to help sustain the urban forest (City of Portland Office of Government Relations, 2021).
Funding	<ul style="list-style-type: none"> ● Portland has various funding sources that allow the City to give away free trees to the public. The City of Portland Code 11.15.010 implemented the Tree Planting and Preservation Fund that is used to plant trees on public or private property, including streets (City of Portland, 2019). The fund is also used to purchase conservation easements and to acquire land to permanently protect existing trees. Contributions to the funding source include payments from tree replacement permit issuance, payment made in lieu of preservation where planting is not feasible due to “characteristics or construction, payment of restoration fees for enforcement actions for private trees, and voluntary contributions” (City of Portland, 2019). ● Portland Parks and Recreation offers financial assistance for tree stewardship events, such as workshops, community projects, and outreach activities for Neighborhood Tree Stewards and Neighborhood Tree Teams. Community members must apply for stewardship support and the project must be eligible for approval. A key component to the Urban Forestry Stewardship Support funding is that projects should benefit the public and are not available for privately owned trees (City of Portland, 2021d). ● The city also offers a variety of grants which include the BES Community Watershed Program Grants, East Multnomah Soil and Water Conservation District Grants, East Portland Action Plan Grants, Nature in Neighborhoods Capital Grants, Neighborhood Small Grants Program, and Portland Garden Club Grants. These funding sources give community members the opportunity to initiate their own urban forestry projects if they meet the listed criteria.

<p>Equitable Pathways to Green Careers</p>	<p>Portland Parks and Recreation offers various opportunities for employment and education in urban forestry. Their programs include youth and young adult employment, education, and internship programs in conservation, environmental education, and job training.</p> <ul style="list-style-type: none"> Portland’s Youth Mentoring Collaborative provides guidance for diverse leaders to get involved in environmental education and conservation. The Youth Mentoring Collaborative partners with additional organizations, such as Portland Parks and Recreation, Metro, the U.S. Fish and Wildlife Service, the Audubon Society, and more. These partners meet regularly to share best practices and coordinate efforts. A key aspect to this organization is providing tools for youth to get involved with “green careers”. The partnership promotes mentorship, networking with environmental employers, and volunteer opportunities that enhance job skills (Ecotrust & PolicyLink, 2017, p. 35). Portland is also taking a systemic approach to equitable hiring initiatives through the City’s Prime Contractor Development Program, Subcontractor Equity Program, and Minority Evaluator Program (Ecotrust & PolicyLink, 2017, p. 17). In 1995, a disparity study led to the implementation of the Fair Contracting and Employment strategy to promote opportunities for minority-owned, women-owned, and emerging small businesses (MWESB) (Ecotrust & PolicyLink, 2017, p. 19). These initiatives allow these firms to compete for contracts against larger corporations by advertising, networking, and policy. Construction projects above \$150,000 are required to allocate 20% of hard construction dollars to be contracted to MWESB-certified firms as subcontractors (Ecotrust & PolicyLink, 2017, p. 19). These contractors are involved with green infrastructure projects, ecological restoration activities, urban forestry, public access to urban natural areas, and more. <p>Portland provides translational services regarding tree information in various languages (City of Portland, 2021f). The city also encourages residents to request translation, interpretation, accommodation, modification, or additional information as applicable. Job postings in the urban forestry division are posted in Spanish and shared on social media. The PP&R Urban forestry division offers free, hands-on workshops to the public that include pruning, species selection, tree plantings, and education on pests that threaten the urban forest. To accommodate the impact of the COVID-19 pandemic, the City transitioned the workshops to an online format that also allowed residents to interact with tree experts. These videos remained online for all residents to have access (Portland Parks and Recreation, 2021, p. 6). The City’s partnership with Friends of Trees promotes equity and inclusion and looks to engage with diverse voices.</p>
<p>Preventing Green Gentrification</p>	<p>The City of Portland’s Bureau of Planning and Sustainability (BPS) contracted an external consultant, Dr. Lisa Bates, to assess vulnerability of gentrification and displacement in different neighborhoods. The initial report was drafted in 2013 and a subsequent study was conducted in 2018. Portland acknowledged that gentrification and displacement have been prominent in the last two decades and sought to identify promising practices for addressing these concerns. Key findings from the report</p>

	<p>suggested a need for (i) an inclusive development paradigm with a racial/ethnic equity lens, (ii) a recognition of how public investments affect the private market, (iii) ways to anticipate housing demands and market changes, and (iv) options for utilizing the public sector to regulate and engage a range of private development and community actors to minimize the effects (Bates & City of Portland Bureau of Planning and Sustainability, 2013, p. 4).</p> <p>In the 2018 updated report, The BPS listed their goal for equitable access to affordable housing, making special efforts for BIPOC communities, people with disabilities, and low-income households (City of Portland Bureau of Planning and Sustainability, 2018). The City established a policy framework that evaluates plans and investments, mitigates anticipated impacts, coordinates plans and investments with programs that protect residents in impacted neighborhoods, and uses public investments to create permanently affordable housing (City of Portland Bureau of Planning and Sustainability, 2018, p. 4-5).</p>
<p>Dedicated Committee/ Task Force</p>	<p>Portland’s city code Title 11 Trees established the Urban Forestry Commission (UFC) that advises the City Forester, Parks Director, Commissioner in Charge of Parks, and City Council on the regulations, budget, policies, and plans associated with the urban forest (City of Portland, 2021e). The UFC also contributes to the permitting process for certain cases, nominates new and approves removal of Heritage Trees, and plays a significant role in updating the City’s Urban Forest Management Plan. The UFC consists of 11 volunteers that specialize in different aspects of urban forestry with a mission to “advocate, advise, and engage the public” (City of Portland, 2021e).</p>
<p>Clear Roles & Responsibilities</p>	<p>The City of Portland established an action item in their 2004 Urban Forestry Management Plan to coordinate the roles, responsibilities, policies, and projects for the planning and management of the urban forest. This includes City bureaus, agencies, and additional partners, such as non-profit organizations. They highlighted that more organizations are involved in the management of the urban forest and many of these bureaus/agencies have different visions and objectives, which results in fragmentation, overlap, and bureaucratic conflict. The Plan also acknowledges that an increase in complex rules and regulations makes it more difficult to coordinate between bureaus. Thus, the Plan clearly outlines the roles and responsibilities of different departments, subcommittees, and programs as they relate to urban forestry goals and objectives (Portland Parks and Recreation, 2004, p. 33-48). The Plan also provides a visual representation of the relationships between different departments and agencies (Portland Parks and Recreation, 2004, p. 44-45).</p>
<p>City Maintenance of Public Trees</p>	<p>In Portland’s 2007 Urban Forestry Action Plan, the City made it a goal to evaluate the possibility of the City managing all street trees as a part of the five-year actions (Portland Parks and Recreation p. 10, 2007). However, by 2020, their priorities shifted to educating residents on their responsibilities and maintenance techniques (Portland Parks and Recreation, 2021).</p> <p>A 2009 report by Davey Resource Group assessed the initial cost of managing street trees as public assets (Davey Resource Group, 2009). This report analyzed the cost and benefits associated with city</p>

	<p>maintenance of public trees, including factors such as inspections, pruning, planting, tree removal, sidewalk repair, pest control, leaf cleanup, and fertilization services (Davey Resource Group, 2009). Due to their projections, the City of Portland could not secure funding for the transition of maintenance. However, based on our interview with the lead urban forester, the cost modeling analysis does not align with the current maintenance costs, and they are currently reevaluating this initiative.</p>
<p>Climate Resilience</p>	<p>In the City’s 2015 Climate Action Plan, equity becomes a more prevalent priority. They list ‘equitable’ as a part of their 2050 vision and state, “communities of color and low-income populations are involved in the development and implementation of climate-related programs, policies and actions” (Multnomah County & City of Portland, 2015). The Climate Action Plan discusses rising temperatures in the Pacific Northwest and explains that UHIs will become intensified. The City and County acknowledges that more vulnerable populations, such as communities of color and low-income populations, do not have the same ability to respond to climate change. The Plan emphasizes the need for climate resilience for vulnerable groups and to combat legacies of inequitable public policies (Multnomah County & City of Portland, 2015, p. 25). The Plan also has a ‘Climate Action Through Equity’ section that states, “equity is when all individuals have access to the opportunities necessary to satisfy their essential needs, advance their well-being and achieve their full potential... Climate equity ensures the just distribution of the benefits of climate protection efforts and alleviates unequal burdens created by climate change” (Multnomah County & City of Portland, 2015, p. 42).</p>
<p>Promising Policies & Ordinances</p>	<p>Title 11 Trees encodes protections for trees and delegates special considerations for Heritage Trees (City of Portland Code, 2015).</p> <p>Notable Ordinances</p> <ul style="list-style-type: none"> ● An applicant shall preserve and protect at least 1/3 of the non-exempt trees 12 inches and larger in diameter located completely or partially on the development site, unless mitigation occurs (City of Portland Ord. § 11.50.040 C.1.a.(2)). For each tree 20 or more inches in diameter not preserved and protected, payment to the Tree Planting and Preservation Fund is required. The fee is calculated using the per-inch Planting and Establishment Fee in Lieu for development in the adopted fee schedule for Title 11. (City of Portland Ord. § 11.50.040 C.1.a.(2); City of Portland Code, 2015). ● Projects are exempt from the mitigation requirements in §11.50.040 C.1.b.(2) if the development will be an affordable housing development approved for system development charge exemptions under § 30.01.095. The amount of the mitigation exemption shall be prorated to a percentage equal to the percentage of dwelling units on the development site that are approved for the systems development charge exemption in § 30.01.095. The Director of the Portland Housing Bureau may adopt administrative rules for the administration of § 11.50.040 C.1.d. (City of Portland Code, 2015)

Providence, RI - Projected as one of the city’s that will feel the dramatic rise in heat due to climate change faster than most places in the US, Providence, RI is a city putting in lots of work around increasing their tree canopy. The City and non-profit partners are currently in the process of creating their PVD Tree Plan, an equity-focused strategic vision and action plan for urban forestry in Providence (Providence Neighborhood Planting Program, n.d.). This will be Providence’s first urban forestry master plan.

<p>Partnerships</p>	<p>The Providence Neighborhood Planting Program (PNPP) is a partnership between the Mary Elizabeth Sharpe Providence Neighborhood Planting Program Fund, the City of Providence, and residents and community members of Providence who work closely with the Forestry Division of the Providence Parks Department. On a mission to “plant and steward street trees in Providence and to cultivate engagement with the urban forest,” the PNPP has been a critical partner to the City in progressing urban forestry practices and programs. Within the realm of equity, PNPP is a lead partner in the PVD Tree Plan (Providence Neighborhood Planting Program, n.d.). Other PVD Tree Plan partners: The Nature Conservancy, SustainPVD, Groundwork RI, American Forests, DEM RI, RI Dept. of Health, Providence Parks and Recreation, and more.</p> <p>A notable mention is also that the State of Rhode Island’s Department of Health is currently partnering with American Forests to create an Urban Forests for Climate Health Initiative (which will impact Providence, RI). In collaboration, they are creating a toolkit specifically for Rhode Island municipalities to utilize to “help their urban forestry programs reach their potential for climate mitigation, public health and environmental justice.” This toolkit will include: a statewide climate goal; a tree equity score for each municipality; a climate and health forestry action guide (a step-by-step guide to help municipalities set goals); a planter tool (a mapping tool that locates where plantings hold most potential for maximizing public health outcomes in vulnerable communities); learning labs and workshops (American Forests, 2019).</p>
<p>Assessing Distribution</p>	<p>PVD Urban Tree Canopy Study was completed in 2011 and in 2019.</p>
<p>Equity Performance Metrics/Indicators</p>	<p>Targeted planting in Upper and Lower South Providence, two low-canopy and low-income neighborhoods disproportionately burdened by the impacts of climate change and environmental justice (Climate Change Response Network, n.d.).</p>
<p>Social Equity in Urban Resilience Planning</p>	<p>Specifically hired Equity & Engagement consultants for the PVD Tree Plan: Youth in Action, Movement Education Outdoors, and Monica Huertas.</p> <p>Within the PVD Tree Plan summary document, it states, “The PVD Tree Plan will develop the strategies to share the benefits and burdens of the urban forest equitably across all our neighborhoods” (Providence Neighborhood Planting Program, n.d., <i>PVD Tree Plan Summary</i>).</p>
<p>Funding</p>	<p>A unique method of funding tree planting efforts was seen in Rhode Island through the utilization of an area’s Health Equity Zones (HEZ) status. (This method was only seen once and just very recently). Implemented in 2015 and created by the Rhode Island Department of Health, a HEZ is an innovative, place-based approach that helps communities come together to build the infrastructure they need to reach healthy, systemic changes at the local level. These zones represent</p>

	<p>different geographic areas where opportunities are paired with investments to address burdensome and inequitable health outcomes (Rhode Island Department of Health, 2021). When an area is designated as an HEZ it helps the state prioritize investments in these communities. Where tree planting has been impacted by HEZ status was Pawtucket and Central Falls (close neighbors of Providence), two areas that were awarded a \$100,000 Tree Planting for Climate Resilience and Human Health grant to address tree inequity. This grant’s funds came from a collaboration between multiple stakeholders looking to specifically increase tree cover in HEZs (American Forests, n.d, <i>American Forests Awards First Tree Planting for Climate Resilience</i>). Currently, Rhode Island has ten different HEZs, including Central and East Providence.</p>
<p>Equitable Pathways to Green Careers</p>	<p>The Providence Neighborhood Planting Committee (the non-profit spearheading much of the city’s urban forestry equity work), was just awarded grant funding to have a TerraCorps member (part of Americorps) join as a Community Engagement Coordinator. TerraCorps is a highly equity-focused service program, on a mission to “prepare and mobilize emerging leaders to help communities gain access to and conserve land for people and nature” (TerraCorps, n.d.).</p>
<p>Preventing Green Gentrification</p>	<p>A PowerPoint slide deck shared from a 3/10/21 presentation by the Providence Neighborhood Planting Program discussed their PVD plan (urban forest plan) approaches and goals. Slide seven states the plan will, “conceive broadly of the possible uses, implications, impacts, and outputs of an urban forest plan.” In an interview with Cassie Tharinger, PNPP’s Executive Director, she addressed this by saying they acknowledge it is a potential implication but are unaware how yet to combat it.</p>
<p>Dedicated Committee/Task Force</p>	<p>In 2017, the Environmental Justice League of Rhode Island, Groundwork Rhode Island, and the City of Providence’s Office of Sustainability established the Racial and Environmental Justice Committee (REJC). This committee is made up of people of color from frontline communities throughout the City (City of Providence, 2020, <i>Equity in Sustainability Summary Report</i>). This committee serves as a primary avenue for people of color to build decision making strategies at the city level (Facilitating Power et al., n.d.). Within the overview of Providence’s <i>Equity in Sustainability</i> report that the REJC helped create, disparate tree coverage in low-income communities was identified.</p> <p>Within the PVD Tree Plan, there are currently three committees: Steering, Data and Research, and Community Engagement (Providence Neighborhood Planting Program, n.d., <i>PVD Tree Plan Presentation to ESTF</i> [Video]).</p>
<p>Clear Role & Responsibilities</p>	<p>The City of Providence shows having a strong handle on clear roles and responsibilities. The Urban Forester, Doug Still, works extremely closely with PNPP, even being listed on their website as one of their team members. There is high collaboration between the two. Cassie Tharinger expressed during the interview with the team, however, that they do face challenges with communicating with other relevant governmental agencies i.e., breaking down the silos.</p>

Maintenance	<p>Forestry division responsible for maintaining all 27,400 street trees and trees in parks / on public property. Helen Walker Raleigh Tree Care Trust: Endowment helps with ongoing maintenance of city trees.</p> <p>“Block pruning”: A systematic approach to maintenance instead of a reactionary one to calls. Found they can prune two times as many trees when it’s systematically done. More equitable because not just tending to the “squeakiest wheel”.</p> <p>Utilization of curb cut tree pits (Providence Neighborhood Planting Program, n.d., <i>PVD Tree Plan Summary</i>).</p>
Collaborating Towards Common Goals	<p>Increasing tree canopy is listed in the City’s sustainability plan (City of Pittsburgh, Office of Sustainability, 2014).</p>
Ordinances	<p>Ord. 1985, ch. 85-59, § 7, 5-21-85 / Sec. 23½-23. - Mary Elizabeth Sharpe Street Tree Advisory Committee: “It shall also be the duty of the city forester to work in conjunction with the Providence Street Tree Advisory Committee to define street tree policies and priorities and to administer "Mary Elizabeth Sharpe Street Tree funds."</p>

Salt Lake City (SLC) - Salt Lake City has three on-going initiatives to promote urban forestry: the development of a new Public Lands Master Plan and the Urban Forest Action Plan. In the city’s new Public Lands Master Plan, slated to be released this summer, SLC called on its community members to reimagine the future of their public lands, including its urban forests. The Urban Designer for Salt Lake City, Laura Bandara, indicated in an email correspondence to MENV students that a draft of the Urban Forest Action Plan will be available to the public in October. According to Bandara, the plan “provides a holistic view of the city’s urban forest in order to address interconnected systems, assess challenges and opportunities, develop priorities, find solutions, and build a long-term plan of action.” It also “foregrounds equity as a critical goal,” Bandara added. The third initiative is Salt Lake City Mayor Erin Mendenhall’s 1000 tree planting initiative.

Assessing Distribution	<p>Mayor Erin Mendenhall vowed to implement a 1000 trees initiative over her four-year term. The initiative is designed to “improve environmental equity” by specifically planting in westside neighborhoods that typically endure the worst air quality in the city (City of Salt Lake, 2020)</p>
Social Equity in Urban	<p>The Reimagine SLC Public Land Master Plan includes three community engagement windows in its development process. During the phase one “discovery” period, the city created a six-week online survey (available in English and Spanish) with community stakeholder focus groups to establish a foundation for understanding and provide a platform for the public to share new ideas. In the second phase, the city conducted over 7,000 “intercept interviews” through the following tactics: ice cream and food truck pop-up events, snack bike trailers stationed along trail sides, and focus groups with stakeholder groups who provide services to underserved populations. The</p>

	<p>intercept interviews were successful at reaching more diverse respondents compared to the initial online survey that reached respondents who were overwhelmingly white. The final community engagement window will be held after the drafting of the plan to ensure that community input is adequately incorporated into the plan.</p> <p>Furthermore, in an interview with MENV graduate students, Nancy Monteith, the project manager of the Reimagine SLC initiative, noted that hiring an equity consultant was instrumental in ensuring that equity principles are embedded within the initiative.</p>
<p>Equity Performance Metrics/Indicators</p>	<p>As part of the city’s community engagement process, Salt Lake City created an engagement metric for the year-long planning process to engage at least 10,000 community members who are representative of the city’s demographic composition.</p>
<p>Ordinances</p>	<p><i>Relevant Ordinances</i></p> <p>2.26.190: Street Trees; Private property owner responsibilities: Any owner of private property, abutting city parking/planting strips upon which street trees are located, shall have the following responsibilities:</p> <ul style="list-style-type: none"> A. Periodic watering and fertilization of street trees when necessary to maintain good health and vigor; B. Protection of street trees against damage caused by lawn mowers, weed trimmers, snowblowers and similar equipment. (Ord. 75-88 § 1, 1988) <p>2.26.210: Landscape permit for public right-of-way It is unlawful for any person to plant, prune or remove any public tree, without first obtaining a permit from the department of public services. Permits shall not be required for work performed by city personnel.</p> <ul style="list-style-type: none"> A. Planting And Maintaining Public Trees: The Salt Lake City urban forestry standards and specifications shall be used as a guideline for planting and pruning public trees. B. Removing Trees: The urban forester must approve any permit for removal of public trees and as a condition, the permittee may be required to compensate the city for the value of the tree(s) removed either by replacement thereof or by monetary assessment. C. Permit Fee: Commercial companies, public utilities or individuals employed in the landscaping or arboricultural business shall be required to pay a permit fee per job as shown on the Salt Lake City consolidated fee schedule or a permit fee per year as shown on the Salt Lake City consolidated fee schedule. (Ord. 24-11, 2011) <p>2.26.300: Protection of public trees near construction activities Any tree located on city property in the immediate vicinity of any excavation, demolition or construction site of any building, structure, street or utilities work, which has potential for injury, shall be protected from such injury. (Ord. 75-88 § 1, 1988) (City of Salt Lake, 2015).</p>

San Francisco, CA - San Francisco is working towards increasing the overall urban forest canopy cover with a tree planting goal set for 2050 and equity is emphasized in the city's approach to urban forest management. A significant step in achieving the canopy goal was development of the fully funded street tree care program, StreetTreeSF.

<p>Partnerships</p>	<p>The Sunset Boulevard Reforestation Program is a partnership between Climate Action Now, The California Native Plant Society, the Department of Public Works, Friends of Sunset Boulevard, and the San Francisco Public Utilities Commission. With the help of volunteers and a youth program partnered with George Washington High School, the program will plant thousands of trees and native coastal shrubs along with pipes bringing recycled water. The program is funded by the California ReLeaf Social Equity Grant Fund and, while the neighborhoods surrounding Sunset Boulevard are not classified as disadvantaged, the program is committed to recruiting volunteers from multicultural backgrounds creating inclusive outreach efforts to involve underserved communities within the city (Climate Action Now, n.d.).</p> <p>Friends of the Urban Forest (FUF) and San Francisco Public Works (SFPW) have a strong partnership that has developed over the forty years since FUF began. The StreetTreeSF Program, run through SFPW, funds tree maintenance such as pruning and tree removal. It does not fund tree planting, even when trees are removed during maintenance (San Francisco Urban Forestry Council, 2020). FUF engages in a variety of community tree planting efforts that help close this gap in the StreetTreeSF program (Friends of the Urban Forest, 2021). The partnership between FUF and SFPW contributes to the city reaching its canopy cover goals and increasing equitable distribution of trees through tree planting and care.</p>
<p>Assessing Distribution</p>	<p>EveryTreeSF is a complete inventory of the city's street trees that identifies the location, species, and condition of every street tree within the city. This data helped the Bureau of Urban Forestry (within SFPW) prioritize tree maintenance during the beginning years of the StreetTreeSF Program (San Francisco Planning, n.d.).</p>
<p>Social Equity in Urban Resilience Planning</p>	<p>FUF currently has funding to plant trees free of charge in “unjustly underforested neighborhoods” through 2022 in an effort to increase canopy distribution throughout the city (Friends of the Urban Forest, n.d.). Residents and businesses located in these zones may request a tree to be planted adjacent to the property and participate in the planting process. After planting, FUF prunes the trees until the third year when the city takes over the responsibility of routine street tree maintenance through the StreetTreeSF program (Friends of the Urban Forest, n.d.).</p>
<p>Funding</p>	<p>The most significant change in San Francisco's urban forest management funding was the creation of the StreetTreeSF Program. San Francisco's 2014 Urban Forest Plan focused on street trees and provided specific recommendations, goals, and actions aimed at exploring sustainable funding opportunities for the city's street tree maintenance. Part of the actions included a Street Tree Financing Study that looked into potential ways to fund long-term maintenance required to continue growing and caring for the city's urban forest. Results of the study suggested that routine maintenance of street trees is a more effective and efficient approach compared to responding to</p>

	<p>hazardous tree maintenance upon request. The study showed this could potentially save SFPW costs in the long term (AECOM, 2013). Through collaborative efforts by various groups such as the San Francisco Urban Forestry Council and Friends of the Urban Forest, Proposition E passed with 79% support in 2016 and this established a sustainable funding source to support a street tree maintenance program managed by SFPW called StreetTreeSF. With the passage of Proposition E in 2016, \$19 million per year of the City’s general fund is set aside to pay for upkeep and maintenance costs for street trees without raising taxes (San Francisco Public Works, 2017). However, a challenge of the StreetTreeSF program is that it only funds the maintenance costs of street trees and if a tree needs to be removed, the program does not cover the cost of replanting. Therefore, it is important that the city continues to collaborate with nonprofit organizations with tree planting initiatives and pursue grants and other funding sources to ensure replanting efforts are adequately funded.</p> <p>The San Francisco Administrative Code establishes the Public Works Adopt-A-Tree fund. It is a category eight fund that receives all monetary donations, administrative fees, permit fees, fines, and in-lieu fees in accordance with Article 16 of the Public Works Code that can be used for both tree planting and maintenance by SFPW (San Francisco Administrative Code, 2000).</p>
<p>Equitable Pathways to Green Careers</p>	<p>Friends of the Urban Forest has an outreach education program called Green Teens. It is among one the few paid urban forestry vocational skills training programs in the U.S. and provides at-risk youth (14-19 years old) with opportunities to develop lifelong skills in the “green” job market (Friends of the Urban Forest, n.d.). Additionally, FUF has the Green Crew that consists of two to three members from the Zuckerberg San Francisco General Hospital’s Wraparound Project which assists young survivors of violence to learn new skills and move forward in their careers (Friends of the Urban Forest, n.d.).</p>
<p>Dedicated Committee/ Task Force</p>	<p>San Francisco’s Urban Forestry Council was created in 2003 after replacing the San Francisco Tree Advisory Council. The Council was established in Chapter 12 of the Environment Code to oversee, advise, and enhance the management of the city’s urban forest with the mission is “to guide the stewardship of San Francisco’s trees by promoting a healthy and sustainable urban forest that benefits all San Franciscans” (San Francisco Urban Forestry Council, 2019). Substantial input and involvement from the Council were provided in the formation of the 2015 Urban Forest Plan. To date, one of the most significant roles the council has played was the passage of Proposition E (see Funding section), where the Council and its members contributed to the creation of the proposition and garnering support for it (San Francisco Urban Forestry Council, 2019). Each year, the Council publishes an annual urban forest report which provides an analysis of the coordinated efforts between public, private and nonprofit organizations to report on progress, challenges, and opportunities within urban forestry management.</p>
<p>Clear Roles & Responsibilities</p>	<p>To better manage San Francisco’s urban forest the city broke up the urban forest plan into three phases. The Urban Forest Plan (Phase 1: Street Trees) was adopted in 2015 and provides recommendations specifically tailored to the successful maintenance of the urban forest’s street</p>

	<p>trees. It focuses on the role of SFPW, partnerships with the nonprofit organization Friends of the Urban Forest, and the role of the Urban Forestry Council related to street tree maintenance. Phase 2: Parks & Open Spaces is currently in progress and will focus on the Parks and Recreation Department's role in managing the urban forest trees within the city's parks as well as community organizations and other relevant City agencies. Lastly, Phase 3: Buildings & Private Property will focus on coordination between property owners, the Planning Department, Urban Forestry Council, City agencies, and community organizations to ensure that backyard trees growing on private property are properly maintained and contribute to a thriving, healthy urban forest (San Francisco Planning Department et al., 2014). While the future phases are still in the planning process, breaking down urban forest management into separate plans improves the city's efforts because it improves the coordination and collaboration needed to efficiently manage the different areas of the city's urban forest.</p>
<p>City Maintenance of Public Trees</p>	<p>When the City's Urban Forest Plan (Phase 1: Street Trees) was adopted in 2015, the maintenance of street trees was distributed among SFPW and adjacent property owners. Nearly two thirds of property owners were responsible for maintenance of street trees in front of their property (San Francisco Department of Public Works, n.d.) and the management approach was referred to as a "confusing patchwork" (San Francisco Planning Department et al., 2014). As a result of budget cuts and funding challenges in 2014, SFPW planned to transfer maintenance responsibilities of about 24,000 street trees to property owners over a seven-year period (San Francisco Department of Public Works, n.d.). The Urban Forest Plan recommended reversing this transfer and, instead, determining and pursuing viable funding options to establish a fully funded program where the SFPW would assume responsibility for all street tree maintenance. Not only would standardize maintenance provided by SFPW improve coordinated management, but also it would help San Francisco achieve the goal of planting 50,000 new trees by 2050.</p> <p>Shortly after the Urban Forest Plan, the plan's recommendation was fulfilled with the passing of Proposition E in 2016. This created the fully funded street tree maintenance program, StreetTreeSF, managed by SFPW and transferred the maintenance responsibility of street trees from property owners to the city. The program also includes maintenance of root-damaged sidewalks. While equity was not central to the plan's recommendation or the city's pursuit of a fully funded maintenance program, shifting the responsibility from private property owners to the city alleviated the financial burden of tree maintenance for many property owners and contributed to the city's goals focused on equitable tree canopy distribution. This strengthened the city's overall approach to an equitable urban forestry program.</p>
<p>Promising Policies & Ordinances</p>	<p>San Francisco Public Works Code, Article 16: Urban Forestry Ordinance</p> <p>Outlines the purpose of the ordinance including the power and duties of the Urban Forestry Council (Sec. 803) and the Department of Public Works Urban Forestry Program (Sec. 807). Additionally, it describes the responsibility of street tree maintenance (Sec. 805), referencing the transfer of responsibility to the City starting July 2017 as a result of Proposition E passing in 2016. Establishes landmark and significant tree protections (Sec. 810 & 810a).</p>

Seattle, WA - Seattle’s 2020 Urban Forestry Management draft and Equity and the Environment initiatives highlight the City’s commitment to an equitable and sustainable urban forest. While urban forestry staff and the Urban Forest Commission make strides in advocating for equity and increasing UTC, funding for urban forestry has recently been dramatically reduced. The Pacific Northwest is projected to encounter increased heat waves and elevated maximum daytime temperatures.

<p>Partnerships</p>	<ul style="list-style-type: none"> • Seattle’s Trees for Neighborhoods program provides free trees for Seattle residents. Residents can get up to 4 free trees that also come with a watering bag and mulch for each, training on the proper planting and care, assistance applying for street tree planting permits, ongoing care reminders and pruning workshop opportunities, planting assistance, and street tree evaluations after the first couple of years (City of Seattle, 2021a). Since the program started in 2009, over 11,300 trees were planted in private yards and along the public right-of-way (City of Seattle, 2021a). • The Green Seattle Partnership is a collaborative partnership between the City of Seattle, Forterra, community groups and nonprofits, businesses, schools, and thousands of volunteers work towards restoring and maintaining the City’s urban forest (Green Seattle Partnership, 2021a). They promote community stewardship through events in various parks throughout Seattle. They encourage youth and adult populations to get involved by offering a wide range of opportunities at different locations. However, this partnership mainly focuses on working in Seattle Parks and Recreation sites.
<p>Assessing Distribution</p>	<ul style="list-style-type: none"> • The 2016 Seattle Tree Canopy Assessment utilized LiDAR (light detection and ranging) to determine Seattle’s progress towards it’s 30% UTC goal, UTC distribution in Equity and Environment Initiative focus areas, coniferous vs deciduous ratios, heat island effect hotspots, impacts from development, and volume of vegetation that is within the clearance area of Seattle City Light’s distribution and transmission systems (City of Seattle, 2016). Notably, they found disparities in UTC distribution when considering factors such as socioeconomics and Census data. A key recommendation was designing neighborhood tree canopy goals to maximize limited resources (City of Seattle, 2016). • Seattle was a Pilot City in American Forests Tree Equity Score project. This assessment provided Seattle with tree planting strategies to improve neighborhood scores and to identify priority areas (Tree Link News, 2021).
<p>Social Equity in Urban Resilience Planning</p>	<ul style="list-style-type: none"> • To develop the 2020 Urban Forest Management Plan, the Urban Forestry Core Team worked with Seattle’s Public Utilities’ Community Connections program and the Department of Neighborhood’s Community Liaisons programs “to engage native peoples, as well as the African American, East African, Chinese, and Latinx communities living in and around the Greater Seattle region” (Trees for Seattle p. 8, 2020). They stated that their lack of resource availability limited their scope of focus, but online feedback forms were translated to Chinese

	<p>(traditional and simplified), Korean, Somali, Spanish, and Vietnamese. Feedback from these focus groups was used to produce the 2020 drafted plans, and actions were incorporated to keep the community involved in urban forestry. Key recommendations were more translation services, developing strategies and goals that focus on racial and social equity, and ongoing engagement (Trees for Seattle, 2020).</p> <ul style="list-style-type: none"> • The City produced a Racial Equity Toolkit in accordance with the Seattle Race and Social Justice Initiative that lists step-by-step instructions for assessing policies, initiatives, services, programs, and budget issues. A broad outline of these steps include: (i) set racial equity outcomes for those most harmed by racism using an intersectional framework, (ii) involve stakeholders + analyze data, (iii) determine benefit and/or burden, (iv) advance opportunity or minimize harm, (v) evaluate, raise racial awareness and be accountable, (vi) report back through information sharing (Seattle Race and Social Justice Initiative, 2020). • The Green Seattle Partnership website provides translational services that are indicated by country flags, which includes Amharic, Chinese (traditional and simplified), Filipino, Khmer, Korean, Somali, Spanish, and Vietnamese (Green Seattle Partnership, 2021a). Partnerships with nonprofits, such as the Partner in Employment and ECOSS, specialize in multicultural environmental outreach while emphasizing diversity and inclusion in environmental stewardship.
<p>Equitable Pathways to Green Careers</p>	<ul style="list-style-type: none"> • Seattle’s Partner in Employment (PIE) aims to provide long-term economic stability for refugees and immigrants by offering tailored assistance in language acquisition, housing stabilization, workforce entry, and job-training in higher-wage industries (Green Seattle Partnership, 2021b). As of 2020, PIE began to help immigrant and refugee youth enter environmental fields by offering paid training in restoration and environmental science. In the summer of 2020, the Youth Restoration Training Crew (YRTC) was established with funding support from the Port of Seattle (Green Seattle Partnership, 2021b). Since the program launched, 43 youth employees have worked on restoration projects. In addition to hands-on environmental training, the crew will also contribute to the creation of site management and planting plans (Green Seattle Partnership, 2021b). • ECOSS is an urban environmental non-profit that serves to connect multicultural Seattle residents to environmental stewardship events. This organization acknowledges that different communities have varying connections to nature (Green Seattle Partnership, 2021c). Based on this, ECOSS plans two predetermined stewardship events, then works with community members to co-create additional events (Green Seattle Partnership, 2021c).
<p>Preventing Green Gentrification</p>	<ul style="list-style-type: none"> • The City of Seattle’s Tree Protection Executive Order 2017-11 § 4 highlights the need for urban forestry goals to correlate with Mandatory Housing Affordability (MHA) development standards (Burgess, 2017; City of Seattle, 2021b). This order enacted a collaboration between

	<p>the Office of Planning and Community Development (OPCD) and the Urban Forestry Core Team to ensure that tree requirements are updated and included in MHA policies.</p>
<p>Dedicated Committee/ Task Force</p>	<ul style="list-style-type: none"> The City of Seattle passed Ordinance 123052 in August 2009 that established the Urban Forestry Commission (UFC) (City of Seattle, 2021c). The UFC advises the Mayor and City Council on policies and regulations that govern the protection, management, and conservation of trees and vegetation in Seattle. The commission includes 13 individuals that are experts in various types of specializations, such as wildlife biologists, urban ecologists, arborists, hydrologists, representatives from NGOs, representatives from the development community, community leaders, engagement coordinators, environmental justice representatives, university representatives, economists, and a public health representative (City of Seattle, 2021c).
<p>Clear Roles & Responsibilities</p>	<p>Seattle’s 2020 Urban Forest Management Plan draft clearly outlines the roles and responsibilities associated with the urban forest in Table 2 (Trees for Seattle p. 18-19, 2020). The Plan lists the department, if they are involved with public, private, or street trees, their responsibilities, contact information, and key priorities. Moreover, the City designated roles that prioritize BIPOC communities. These departments include the office of Sustainability and Environment (OSE), Seattle Department of Construction and Inspections (SDCI), Seattle Department of Transportation (SDOT), Seattle Parks and Recreation (SPR), Seattle Public Utilities (SPU), and Trees for Seattle (T4S) (Trees for Seattle p. 18-19, 2020). Nine departments are involved in the management of the urban forest, and their interdepartmental coordination is said to produce effective and consistent results. However, the drafted 2020 plan has not been officially approved by the City Council. Based on our interviews with Seattle stakeholders, the fragmentation of roles and responsibilities can cause conflicting interests if there is not clear communication between departments.</p> <p>Staff meet regularly so the Urban Forestry Core Team can keep each other informed and collaborate on actions. Notably, the City established the Trees for Seattle department to be the “communications umbrella for all of the City’s urban forestry efforts” (Trees for Seattle, 2020). This agency works across departments and builds partnerships with the public to grow and care for the urban forest on private property. T4S also looks to engage with the community and include them on urban forestry projects (Trees for Seattle, 2020).</p>
<p>Collaborating Towards Common Goals</p>	<p>The Seattle Department of Transportation created a Trees and Sidewalks Operations Plan to clarify responsibilities associated with street trees and to provide guidance on the installation, repair, and maintenance of sidewalks and trees in the public right-of way (Seattle Department of Transportation p. 5, 2014).</p>
<p>Promising Policies & Ordinances</p>	<p>Seattle has implemented a variety of ordinances associated with sustaining their urban forest. Similar to other cities' versions of Heritage Trees, Seattle places special protections for ‘exceptional trees’ that provide “unique historical, ecological, or aesthetic value constitute an important community resource” (Seattle Municipal Code ch 25.11).</p>

CASE STUDY CITY WRITE-UPS

Chicago, IL - Chicago has been identified as one of the cities with strong ordinances, robust distribution assessment processes, and partnerships that allow for enhanced urban tree canopy cover. The Chicago Region Trees Initiative (CRTI) – a partnership between 14 organizations ranging from the Chicago Parks Department, the U.S. Forest Service, and the Chicago Department of Public Health – developed a master plan to improve the health and canopy of the Chicago region’s forest by 2050. The master plan was created around four core goals: “to inspire people to value trees; to improve the region’s tree canopy; to reduce threats to trees; and to enhance oak ecosystems” (CRTI, 2019).

<p>Partnerships</p>	<p>The master plan developed by CRTI is the result of region-wide collaboration between the organization’s own staff, the executive advisory council, working groups, advisory committees, and partners. Four separate working groups (stewardship and planting; green infrastructure, policy, and native ecosystems; forest composition and analysis; and risk assessment and management) were established to meet the master plan’s goals and outcomes, as well as ad hoc advisory committees to provide extra support based on needed expertise. For example, the Resources Advisory Committee is composed of development staff from partner organizations. This ad hoc committee is tasked with identifying funding sources with programs related to sustainability and other programs that are in line with CRTI goals (CRTI, 2019).</p>
<p>Assessing Distribution</p>	<p>The CRTI created a map that looks at the benefits of trees at the neighborhood level. The map shows the percentages of tree cover and land overlaid by impervious surfaces, and the financial value those trees give the community. It also indicates information on marginalized populations, heat, air quality, and flooding. This data is currently being used to identify priority areas and capacity building opportunities to improve the urban forest (CRTI, 2019).</p>
<p>Promising Practices and Ordinances</p>	<p>In June 2021, Chicago City Council approved an ordinance to create an Urban Forestry Advisory Board. The board will bring public and private partners to the table to strategically map out pathways for enhancing the urban forest (Wetli, 2021). In an interview our team conducted with Executive Director of the Chicago Region Trees Initiative, Lydia Scott, she noted that the board will serve as a reliable forum to discuss tree canopy initiatives and could help improve communication between residents and decision makers.</p> <p>The CRTI has also developed ordinance templates and urban forest management plan templates that communities can use as a general guide to meet ordinance or management goals related to urban forestry initiatives. Three templates have been developed at varying levels, according to CRTI:</p> <ul style="list-style-type: none"> • “The CRTI ordinance templates provide sample language for the bronze level ordinance, which is the introductory ordinance for a community, that incorporates the use of an urban forest management plan into the community practices.

	<ul style="list-style-type: none"> • The Silver Tree Preservation Ordinance Template is designed to rely on a strong urban forest management plan. With it, a community or landowner can use the ordinance as the guiding strategy for urban forest care and facilitate updates without the need for an ordinance revision. • The highest ordinance level, the gold tree preservation ordinance, includes all of the requirements of the silver level ordinance and provides for preservation and protection of trees on private lands” (CRTI, 2019).
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Detroit, MI - Detroit was identified through research as a city that faced many challenges and struggles to their tree planting programs and efforts. The city was identified as a somewhat hybrid between a case study and target city in the hopes that lessons learned from them will help cities avoid similar setbacks. Majority of information the MENV team will learn will be through interviews; however, the following is available data and information.

Partnerships	The City and the non-profit The Greening of Detroit (TGD) work closely together on tree initiatives. TGD is contracted by the City of Detroit to plant trees as well as to handle maintenance (University of Vermont, 2019).
Assessing Distribution	The City partnered with a University to conduct tree canopy data (American Forests, n.d., <i>From the Field: Detroit</i>) (American Forests just released their Tree Equity score, however). American Forests is part of a coalition called the Detroit Reforestation Initiative that helped raise money to complete an urban canopy assessment (American Forests, n.d., <i>Detroit: A Green City of the Future</i>). Besides the American Forests website, no other information could be found about the Detroit Reforestation Initiative.
Social Equity in URP	Between 2011-2014, a non-profit named The Greening of Detroit (TGD) was in charge of planting street trees on city-owned property. They offered residents free trees to plant but 24% rejected the offer. Researchers from the University of Vermont looked into why this was the case and found that: residents had very little opportunities to influence decision-making at major points in the tree-planting process; The Greening of Detroit selected neighborhoods for tree-planting events that had not requested one themselves to fulfill grant goals; TGD’s community relations staff (2-3 full-time employees) were only given between one week to a month for community engagement in the neighborhoods selected and; lastly, neighbors who had stayed in Detroit through the economic decline ended up with the burden of stewarding their and their neighbors trees with little help from the City. This lack of help in the past made residents wary and resistant to taking on a potential cumbersome burden of a new tree (Carmichael & McDonough, 2019) (Carmichael & McDonough, 2018). Detroit is a great example of how organizations and governments need to engage the community meaningfully and frequently while <i>moving at the speed of trust</i> .

	<p>The researchers provided recommendations for cities to help avoid the challenges Detroit faced. (i) Create mechanisms that allow there to be a follow-up with residents after a tree planting. These mechanisms would help organizations garner support for their tree-planting efforts while allowing for maintenance protocols to be adapted in order to account for any emerging issues residents or the lead tree-planting entity face. (ii) Provide residents with information that is relevant about the trees being proposed to be planted or given out (appearance, lifetime maintenance, etc.). (iii) Have the ability to mobilize resources to act on an environmental justice issue (money, time, and knowledge about collective action strategies to tackle said issue). (iv) Give residents having some degree of decision-making power in who should be responsible for certain aspects of maintenance (Carmichael & McDonough, 2018).</p>
Equitable Pathways to Green Careers	<p>Please reference the Tazo TreeCorps information found above under the Equitable Pathways to Green Careers description. Detroit is one of the cities with this program implemented.</p>
Dedicated Committee/ Task Force	<p>Newly established in 2021, Detroit has created the Climate Equity Advisory Committee (CEAC) working to support the development and implementation of the City’s climate planning and action implementation work. CEAC consists of residents from the most vulnerable communities, local climate justice leaders, and City Officials. One task potentially posed to this committee might be looking at tree equity within Detroit (City of Detroit, n.d.).</p>
Maintenance	<p>In the mid-20th century, wealthier whites fled the city to go to the suburbs, meaning all those financial resources left as well. This included the maintenance of green spaces (Carmichael, 2017). Carmichael found that maintenance was the largest reason residents rejected a free tree during the fall 2011 planting season and one of the top reasons during the fall 2012 planting season in her study (Carmichael, 2017, pg. 33).</p> <p>“To avoid past mistakes in the city's tree planting and maintenance approach” The Greening of Detroit has specifically selected trees that can survive in urban environments and has also guaranteed maintenance for three years after the trees are planted (University of Vermont, 2019) (Carmichael & McDonough, 2018). TGD is the only agency that does maintenance on trees with the exception of removal. TGD staff identified maintenance challenges such as funding and capacity (Carmichael, 2017, 86).</p>

Los Angeles, CA - The City of Los Angeles is in the process of developing an urban forest management plan. The city and county of L.A. recognize the inequitable distribution of tree canopy as well as parks and open spaces. There are a number of community organizations and coalitions working in partnership with the city to improve equitably access to greenspace. With new greening and beautification projects in historically underserved areas, the potential for gentrification and displacement is growing. Addressing causes of gentrification is complex and challenging, but L.A. shows promising practices related to preventing green gentrification.

<p>Preventing Green Gentrification</p>	<p>Measure A: The Safe, Clean Neighborhood Parks, Open Space, Beaches, Rivers Protection, and Water Conservation Measure (Measure A) was passed in 2016. Measure A provides funding to build, maintain, and improve parks, beaches, and other open spaces in Los Angeles County. The funding guidelines for Measure A include anti-displacement strategies, also referred to as a displacement avoidance policy, to address the potential for gentrification as a result of greening projects, especially in underserved communities. The Los Angeles County Regional Park and Open Space District (RPOSD) is responsible for implementing Measure A and developed the Grant Administration Manual (GAM) alongside the Measure A Steering Committee. The Los Angeles Regional Open Space and Affordable Housing Collective (LA ROSAH) collaborated on the development of the anti-displacement strategies and has been involved in other efforts to mitigate green gentrification in LA (Gibbons et al., 2020). The anti-displacement strategies are included within the GAM. RPOSD acknowledges that while it cannot directly fund housing or related displacement projects, the implementation of Measure A should consider strategies to avoid potential gentrification and displacement through a variety of goals and supporting policies (RPOSD, 2019).</p>
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Palo Alto, CA - Although Palo Alto is small with a population of about 66,500, the city created a Tree Technical Manual in 2001 to aid the implementation of the Tree Preservation and Management Regulations. Palo Alto hired its first urban forester in 2012 and developed a thorough urban forestry management plan shortly after. The city has identified the canopy disparity between the north and south areas of the city and is actively working with a local nonprofit, Canopy, to increase tree planting in south Palo Alto. While the city shows a number of promising practices, the Tree Technical Manual is unique to Palo Alto that will be the focus of a case study.

<p>Promising Policies & Ordinances</p>	<p>Title 8 (Trees and Vegetation) of Palo Alto’s Municipal Code includes Chapter 8.10: Tree Preservation and Management Regulations which was codified in 1997. The purpose of the chapter is to “promote health, safety, welfare, and quality of life of the residents of the city through the protection of specified trees located on private property within the city, and establishment of standards for removal, maintenance, and planting of trees.” (Palo Alto Municipal Code, 1999). To implement the chapter, it specifies the need for a Tree Technical Manual that includes specific standards and regulations for tree preservation and management. The chapter lists that these standards and regulations include but are not limited to the protection of trees during construction, maintenance of protected trees, replacement of trees, and criteria to determine hazardous trees (Palo Alto Municipal Code, 1999).</p> <p>The Tree Technical Manual was issued by the City Manager through the Department of Planning and Community Environment and Public Works. It was completed and made available to the public in June 2001 with the intention of complementing the city’s urban forestry programs that managed street and park trees. The specifications included in the manual strengthen the implementation of the Tree Preservation and Management ordinance by providing technical standards that help reach the city’s tree preservation goals (City of Palo Alto, 2001).</p>
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Phoenix, AZ - Phoenix is hosting its first-ever Urban Heat Leadership Academy. Through our research, we have identified this program as a promising practice related to social equity in urban resilience planning and the details of it will be explored as a case study.

<p>Social Equity in Urban Resilience Planning</p>	<p>In summer 2021, the Phoenix Urban Heat Leadership Academy will take place virtually. The Nature Conservancy along with the Phoenix Revitalization Corporation and other partners developed the Urban Heat Leadership Academy for residents to acquire knowledge, resources, and skills about trees and other vegetation that can provide cooling benefits near homes and along walking corridors in their community (The Nature Conservancy, 2020). As one of the hottest cities in the country, Phoenix residents experience high temperatures that pose health risks. Certain neighborhoods experience temperatures that are up to 13 degrees Fahrenheit hotter than others and these neighborhoods commonly have fewer trees (lower canopy cover) and have high rates of poverty. The Academy will be led by experts from Arizona State University, City of Phoenix, Maricopa County Air Quality Department, Trees Matter, Watershed Management Group, Maricopa County Department of Public Health, Valley Interfaith Project, Instituto, and Arizona Sustainability Alliance (The Nature Conservancy, 2021). It will be free of charge, taught in both English and Spanish, and is open to all residents within the Phoenix metro region. This way, residents can actively participate in creating and advocating for a healthier, more livable community.</p>
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Tacoma, WA - The City of Tacoma, Washington’s Urban Forest Management Plan developed strategies and policies to enhance distributive equity and sustainability for the urban forest. The project was established in various phases, including research and information discovery, city staff interviews, benchmarking research, municipal code review and recommendations, urban forest resource and program audit, public surveys, public meetings, short and long-term strategies, tree inventory analysis, tree canopy targets, approval by City Council, development of a trees and sidewalks operations plan, ensuring sustained funding sources, and a tree risk reduction plan (City of Tacoma, 2021).

<p>Social Equity in Urban Resilience Planning</p>	<p>Tacoma, Washington has been making strides to enhance equity and the benefits associated with a healthy urban forest through their ‘One Canopy’ initiative. In 2019, the City Council passed the Urban Forest Management Plan (UFMP) to strengthen ‘Resource Management, Equity and Accessibility, Canopy Health & Growth, Long-Term Funding, Climate Resiliency, Enhanced Ecosystem Services & Benefits, and Community Engagement & Stewardship (City of Tacoma, 2021). Unfortunately, the COVID-19 pandemic has caused financial constraints for the implementation of the UFMP. Currently, the city is focused on creating a trees and construction operations plan, tree risk reduction plan, and an update to the ordinances associated with urban forestry codes to address tree protections and hazardous trees (City of Tacoma, 2021). The urban forestry staff set goals for UTCC based on zoning areas. For instance, in 2011, their downtown tree canopy cover was 3.1%, and they set the goal to achieve 15% (City of Tacoma, 2021). To develop these strategic goals, the city performed extensive tree assessments via aerial footage and analysis.</p>
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SUMMARY

This paper aims to answer the following questions: (i) What promising practices, if any, are other cities using to ensure more equitable urban forestry programs? (ii) How can interagency and external collaboration strengthen and clarify the roles and responsibilities involved in urban forestry programs? The team's research found that cities are demonstrating a range of equity-focused promising practices and policies related to urban forestry. While approaches are similar among cities (i.e., city partnerships with tree planting-focused non-profit organizations), there are a number of unique and uncommon practices identified, such as Boise's use of Silva Cells and Cincinnati's annual assessment that provides funding for urban forestry efforts. The research also demonstrates that strong partnerships between a broad range of stakeholders, clearly coordinated roles for maintenance, planting, and long-term management contribute to a healthier, more equitably distributed urban forest. Target cities have innovative approaches that not only maximize the benefits of the urban forest, but also contribute to a more resilient urban forest in the face of climate change.

While the team's research highlights promising work to build upon, future research is needed to better understand the long-term effectiveness of these practices and policies. The team's interviews with target city actors are intended to close identified gaps in the research and provide additional context and information regarding the promising practices and policies outlined in this paper. The final product of the team's research will be a report that synthesizes the content gathered from the interviews, as well as the findings from this literature review, into specific recommendations for promising practices to ensure that urban forestry is advanced in a way that is equitable.

EVALUATION

Throughout the team's research, many answers were found to our initial research questions; however, many gaps and questions also were revealed. Below are additional questions and topics future research can address, as well as areas that the team's interview process with target cities can further explore.

- The chosen target cities all exhibit strong goals and/or recommendations around tree equity; however, not all of the target cities had an urban forestry master plan. Future research could examine if an urban forestry master plan is necessary to strengthen distributive tree equity within a city, or if having GIS data that analyzes tree inequities is suitable enough to develop adequate strategies. For example, in the March 10, 2021 PNPP presentation (referenced earlier), slide four references how PNPP began to prioritize planting in lowest-canopy neighborhoods but ran into challenges that prompted them to instead pursue a strategic, comprehensive urban forest master plan. Through interviews with PNPP and other individuals in Providence, learning more details about the challenges and overall process will provide valuable recommendation and insight.
- A clear gap we identified is the lack of metrics used to track the progress and overall success of *equitable* urban forestry efforts. While the majority of target cities have data on canopy distribution, tree plantings, and other similar metrics, information about the effectiveness of the implementation process or meeting specific equity targets was often missing. One promising

metric that was identified by the US Forest Service in their Sustainable Urban Forest Guide is quantifying citizen involvement and neighborhood action (Leff, 2016, p. 69).

- Some of the target cities currently have street tree maintenance programs managed through the local government. However, with the exception of San Francisco who recently transferred maintenance power from residents to the SFPW, there is little information regarding the process of transferring responsibility. Street tree maintenance programs that do not require adjacent property owners to manage public trees alleviates cost burdens and removes barriers for underserved communities to plant and maintain more trees. Therefore, determining the feasibility of implementing similar programs in other cities and how to initiate the process could be beneficial for future research.
- Although many of the target cities and nonprofits described in this paper have been doing promising work for years, integrating equity into urban forestry is still a relatively new concept. There are ample opportunities for more practices, policies, and innovations to emerge overtime. Continued research into the implementation and impact of these programs will be important in determining the truly promising policies and practices within equitable urban forest efforts. Learning from others' challenges and mistakes will also help advance progress in this area.
- Oftentimes, equity policies and procedures are created in colonial cultures that perpetuate colonial processes and structures. This can further inequality if it is making indigenous and minoritized communities conform to these practices. Additionally, the participatory process needed for an equitable decision-making procedure takes time, which many urban foresters do not feel they have. Lastly, uneven power dynamics can make progress around equity work difficult.

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