Master Plan: Branch Out Milwaukee Campaign

MILWAUKEE WATER COMMONS

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Project Collaborators

Alliance for the Great Lakes	America Works
City of Milwaukee Environmental Collaboration Office	City of Milwaukee Health Department
Cream City Conservation Corps	
Friends of Milwaukee's Downtown Forest	Great Lakes Opportunities LLC
Greater Milwaukee Synod of ELCA	Groundwork Milwaukee
Harbor District	Hoppe Tree Service
Keep Greater Milwaukee Beautiful	Kompost Kids
Law Office of Dennis M Grzezinski	Medical College of Wisconsin
Milwaukee County Parks	
Milwaukee Metropolitan Sewerage District	Milwaukee Riverkeeper
Milwaukee Water Commons	Nature Conservancy
Northcott Neighborhood House	Park People
Reflo	River Revitalization Foundation
Sherman Park Community Association	
Sixteenth Street Community Health Centers	United States Forest Service
Urban Ecology Center	Victory Garden Initiative
Walnut Way	WE Energies
Wisconsin Arborist Association	Wisconsin Bike Federation
Wisconsin Department of Natural Resources	Wisconsin Green Muslims

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Definitions

Adaptive Management- An approach to decision making in the face of uncertainty, where consensus is reached, and then revisited over time to factor previously unknown outcomes into best practices. Adaptive management generally consists of continuous cycles of planning, implementing, monitoring, analyzing, learning, and adapting. The process of adaptive management is a common tool for making structured decisions that must navigate and govern dynamic systems.

Collective Action- Otherwise known as collective impact, is the commitment of a group of actors from different sectors to a common agenda for solving a complex problem. Collective action differs from, but does not exclude, collaboration.

Commons-Things such as land, water, or language that hold associated benefits and consequences that are shared rather than owned.

Ecosystem- A biological community of interacting organisms and their physical environment.

Environmental Justice- An outcome, where a healthy environment and wellness are respected as a human right for all people and future generations regardless of identity. Ethical issues of justice arise when people, communities, or regions are subject to greater environmental degradation, excluded from a healthy environment, or disconnected from the process of shaping their environment. Environmental justice links environmental sustainability with social justice, to ensure that no population, community, or individual is subjected to bear a disproportionate burden of environmental risks.

Equity- Justice according to natural law or right; specifically: freedom from bias or favoritism. Equity refers to fair and just inclusion- a condition where everyone has the opportunity to participate and prosper. Throughout this report, racial, gender, and economic equity will be used inclusively, because of the intersectionality of bias imposed throughout history on marginalized populations.

- **Economic Equity-** Increase economic stability and reduce poverty by ensuring that economically disadvantaged people and communities have full and fair access to high quality jobs, improved community services and environment, access to affordable housing and transportation, and expanded opportunities.
- **Gender Equity-** Create opportunities and outcomes that ensure that gender identity does not prevent full and fair access to jobs and contracts, and that all benefits and burdens are shared and bias free.
- **Racial Equity-** Create opportunities and outcomes that ensure that people of color have full and fair access to all jobs and contracts, and that all benefits and burdens are shared and bias free.

Food Desert- The USDA generally defines food deserts as neighborhoods that lack healthy food sources. More specific definitions generally take into account the accessibility of sources of healthy food, individual resources that might affect the accessibility of healthy food, and neighborhood level indicators of resources such as average income and access to public transportation. Some partners have clarified the importance of also recognizing *food swamps*- communities that are flooded with unhealthy, highly processed, and low nutrient foods as well as disproportionate advertising for unhealthy foods.

Heat Islands- A phenomenon where buildings, roads, and other impermeable infrastructure replace vegetation to establish dry unshaded areas that have a greater vulnerability to heat. Heat islands are

more susceptible to heating from the sun, and retain heat more readily than moist shaded areas with vegetation.

Hyper Segregation- Hyper segregation occurs when a race/ethnic group is highly segregated in multiple ways, no matter how segregation is conceptualized or measured. Where segregation is the enforced separation of unique groups in a given geography.

Marginalized Communities- Groups of people who are socially excluded from involvement in economic, political, cultural and social opportunities commonly based on their race or ethnicity, gender, income, ability, age, or sexual orientation.

Power Dynamics- The role of power in shaping relationships, actions, and behavior between two or more interacting bodies. Where power is the capacity of individuals or groups to bring about change often through the possession of control, authority, or influence.

Structural Racism- A system in which public policies, institutional practices, cultural representations, and other norms work in various, often reinforcing ways to perpetuate racial group inequality.

Tree Canopy- The layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Vulnerable Communities- Vulnerable communities face historic or contemporary barriers to economic and social opportunities and a healthy environment. The principal factors in community vulnerability are income, race or ethnicity, age, language ability, and geographic location.

Milwaukee Water Commons would like to acknowledge the following groups whose work and wisdom has helped to shape these definitions: The US Water Alliance, The Interaction Institute for Social Change, The Partnership for Southern Equity, Race Forward, The US Department of Agriculture, The US Environmental Protection Agency

Introduction

Project Background

Situated on the shores of Lake Michigan and the confluence of three rivers, Milwaukee has always been a gathering place by the water, and a city defined by its environment. That relationship between people and place is significant for every person that has gathered within Milwaukee's borders. That's why between 2014 and 2016 over 1,300 Milwaukee residents from across the City were consulted to define a vision for the future of Milwaukee's relationship with water (Hall, Ariens, & Bradley, 2016). What resulted from those discussions was proof of the connections between Milwaukee's social and environmental sustainability, and a growing network of individuals and organizations excited to transform our city. The vision for Milwaukee's future as a water centric city consisted of ten key practices and six community driven initiatives. Initiatives quickly became organized working groups, followed by collectively organized programs and projects. Through deliberation and collective action, Milwaukee Water Commons Water Quality initiative began coordinating to pursue programs that targeted community priorities for improving water quality in Milwaukee's Rivers and Lake Michigan, amplifying their shared strengths and networks as organizations and individuals. What started as

recognizing a shared goal around improving water quality fostered the creation of the Branch Out Milwaukee Campaign: a program that has developed the building blocks for a collective action tree planting and maintenance program aimed at equitably growing Milwaukee's tree canopy to maximize the environmental and public health benefits of our City's trees.

The Branch Out Milwaukee Campaign began by engaging and learning from stakeholders working around the City of Milwaukee, as well as by researching case studies from organizations outside of our city who have used their own tree canopy to mitigate social and environmental issues around the country. What we learned is that trees, or a lack of trees, are connected to many problems burdening communities around the City of Milwaukee.

- **Climate Change-** Trees effect our climate by removing carbon dioxide from the atmosphere through the process of photosynthesis, reducing the intensity of the greenhouse effect. A 2005 study cited that trees in urban areas around the United States had a total annual storage of 25.6 million metric tons of carbon, a service with a value of approximately two billion dollars (Nowak, Greenfield, Hoehn, & Lapoint, 2013). Trees are also threatened by changes in climate, which can disturb their tolerances for temperature ranges, amount of precipitation, or expand the habitat of invasive pests such as the Emerald Ash Borer (USGCRP, 2018). Recognizing that climate change is changing our forests, now many cities are developing urban forestry plans using adaptive management, focused on understanding changes in the composition of our forests and utilizing approaches that will be sustainable for planting and maintenance in transitioning ecosystems (Ordonez, Duinker, & Steenberg, 2010).
- **Water Quality-** Trees play a critical role in protecting our lakes and rivers. Trees are a natural green infrastructure, aiding with water filtration, and habitat creation. Water running directly off of the landscape can hold nutrients, chemicals, and pollutants that impact the health of our waterways. Trees help filter water and reduce flooding by slowing down overland runoff, aiding with water infiltration, and stopping precipitation where it falls. Trees also play a critical role in creating habitat in and along our rivers. Shade and cover from trees on the shores of streams, or that have fallen into streams and rivers, can reduce water temperature and create necessary habitat for fish and invertebrates. Trees also stabilize the banks of rivers, reducing erosion, and encouraging healthy winding stream channels.
- **Flooding-** Trees are natural green infrastructure, helping to filter water and reduce flooding by slowing down overland runoff, aiding with water infiltration, and stopping precipitation where it falls. Storm water trees are a well-recognized tool for reducing urban flooding (United States Environmental Protection Agency, 2013). In a study of the impacts of tree loss due to Dutch Elm Disease in Milwaukee, it was estimated that between 1956-2013, the City of Milwaukee lost approximately $44 Million in storm water management services because of its reduced canopy (Sivyer et al., 2016).
- **Heat Vulnerability-** There is increasing attention to the role of trees and green spaces in preventing urban heat islands. Trees can reduce temperature in a few ways, and are growing increasing recognition as a tool for combating heat vulnerability (Lanza & Stone, 2016; U.S. Environmental Protection Agency, 2008). Through the process of evapotranspiration, trees reduce air temperature by removing heat from the atmosphere to evaporate water (Troy & Davis, 2016). Trees reduce absorption and storage of heat by reflecting sunlight that might otherwise meet blacktops or concrete. Shade also plays a major role in cooling provided by

trees, and can have major health benefits (Grant, Heisler, & Gao, 2004; Troy & Davis, 2016). In a 2017 study, researchers in Ho Chi Minh City found that every square kilometer increase in green space per 1000 people would prevent 7.4 deaths caused by heat (Dang, Van, Kusaka, Seposo, & Honda, 2017).

- **Air Quality-** Trees benefit air quality in a few ways. Trees are a major sink for carbon, they remove carbon dioxide from the atmosphere during a process called photosynthesis. During that process trees can also remove other toxins and small particulates from the atmosphere. Larger particulates can also be intercepted by trees, especially by trees with hairy or sticky leaves, until they can be washed off by precipitation. A study conducted in 2006 found that urban trees across the US removed an estimated 711,000 metric tons ($3.8 Billion value) of pollutants (Nowak, Crane, & Stevens, 2006).

- **Public Health**- There is a growing awareness of, and research on, the public health benefits of trees, particularly in urban areas (Ulmer et al., 2016). There are many articles referring to the clear benefits of trees/green spaces, as well as the consequences of the absence of trees/green spaces. Some of the largest contributors supporting this research have been the influence of trees on environmental risk factors (Nowak et al., 2006), encouraging exercise (Pretty, Peacock, Sellens, & Griffin, 2005), building social connections (Coley, Kuo, & Sullivan, 1997), and reducing stress (Gobster & Westphal, 2004). More extensive lists of resources documenting the relationship between trees/greenspaces and public health can be found online at the Vibrant Cities Lab (https://www.vibrantcitieslab.com), or the University of Washington's Green Cities: Good Health website (depts.washington.edu/hhwb/).

    - **Cardiovascular Disease**- Listed as the second leading cause of death in the State of Wisconsin for all ages (Wisconsin Department of Health Services, 2018), cardiovascular disease has been studied to have a clear connection to the presence/absence of trees. Trees and green spaces relieve stress, and encourage physical activities that are commonly associated with reduced obesity and cardiovascular disease. In a study across 15 states surrounding the Great Lakes Region, from 2002-2007, the loss of tree canopy due to Emerald Ash Borer infestation was associated with an additional 15,000 deaths due to cardiovascular disease (Donovan, Michael, Gatziolis, Prestemon, & Whitsel, 2015).

    - **Respiratory Disease**- Listed as the fourth highest cause of death for Wisconsin residents of all ages (Wisconsin Department of Health Services, 2018), lower respiratory disease has been studied to have a clear connection to the presence/absence of trees. There are many studies connecting trees to improvement of air quality, and the removal of particulates which might influence respiratory disease (Nowak et al., 2006). In a study across 15 states surrounding the Great Lakes Region, from 2002-2007, the loss of tree canopy due to Emerald Ash Borer infestation was associated with an additional 6,000 deaths due to lower respiratory disease (Donovan et al., 2015). A study conducted in New York City found that for an increase of 343 trees per Kilometer childhood asthma rates were 29% lower (Lovasi, Quinn, Neckerman, Perzanowski, & Rundle, 2008).

    - **Skin Cancer-** Tree shading can have many positive social outcomes: heat reduction, energy savings, etc. A study conducted in 2002 investigated the connection between the amount of tree shading, exposure to solar ultraviolet (UV) radiation, and ultimately risk

for skin cancer, finding a direct correlation between tree coverage and UV exposure (Grant et al., 2004).

- o **Child Birth Outcomes-** With a growing amount of research on the relationship between greenspaces and public health, there have been a number of studies looking specifically at the relationship between tree canopy and birth outcomes. In 2010, a study in Portland Oregon concluded that a 10% increase of tree canopy cover within 50 meters of a house would lower the number of low weight births by 1.42 per 1000 births (Donovan, Michael, Butry, Sullivan, & Chase, 2011). In response to these and other findings, a 2014 study looked to see if the relationship between trees and birth outcomes could be explained by other factors such as air pollution, noise, or neighborhood walkability, and concluded that there is a direct correlation between increased residential greenness and birth outcomes (Hystad et al., 2014).
- o **Mental Health-** There are well documented relationships between green spaces and mental health, ranging from benefits to mental fatigue (Kaplan 1993, Kaplan 1995) and calming (Heerwagen & Oriens 1993), to the alleviation of symptoms for Alzheimer's, dementia, and depression (Chalfont & Rodiek, 2005; Mooney & Nicell, 1992). Some research around the benefits of trees/green spaces have even cited exposure to green space as a substitute to medication, such as with adults dealing with attention deficit disorder(Taylor, Kuo, & Sullivan, 2001).
- **Economic Stability-** Despite the reputation that trees have for storm and sidewalk damage, well maintained trees are associated with a myriad of economic benefits. The most popular prescription of trees is for "beautification", benefiting tourism/consumerism (Wolf, 2005), employee productivity/satisfaction (Largo-Wight, Chen, Dodd, & Weiler, 2017), and reputation as an eco-conscious space. Trees are commonly tools for economic development, known to raise property values (Tyrvainen & Miettinen, 2000; Wolf 2007). Trees also support individual incomes by alleviating costs such as heating and cooling (Arbor Day Foundation, 2019), or health care (Wolf, 2016). A study done in Toronto, Canada, found that, on average, increasing the tree canopy on a city block by 10 trees "improves health perception in ways comparable to an increase in annual personal income of $10,000, and moving to a neighborhood with $10,000 higher median income or being seven years younger(Kardan et al., 2015)". The same study found that, "having 11 more trees in a city block, on average, decreases cardio-metabolic conditions in ways comparable to an increase in annual personal income of $20,000 and moving to a neighborhood with $20,000 higher median income or becoming 1.4 years younger (Kardan et al., 2015)".
- **Employment-** With the impacts of a changing climate, and a growing interest in green industries, urban forestry has gained traction as a field of employment. The Wisconsin Department of Workforce development projects that between 2016-2026 there will be an 8% increase in the jobs outlook for Wisconsin Arborists (DWD 2018). Many tree planting initiatives and environmental conservation groups around the country, including Keep Indianapolis Beautiful (IN), The Greening of Detroit (MI), Philadelphia Horticultural Society (PA), KNOX Hartford (CT), Groundwork Milwaukee (WI), Cream City Conservation Corps (WI), and the Northcott Neighborhood House (WI) are organizing programs that benefit their community and canopy while also providing wages, skills/certifications, and creating career pathways into green industries such as arboriculture.

This knowledge made it apparent that the outcry from community voices about the need for more trees was more than just an interest in improving aesthetics. Stakeholders from around the City are concerned with the loss of canopy caused by the regional infestation of ash trees, by the Emerald Ash Borer, for a multitude of reasons connected to both public and environmental health and wellness. At the same time, communities around Milwaukee are still recovering from the history of haphazard approaches to tree planting and maintenance following the Dutch Elm Disease epidemic. Milwaukee is the most segregated city in the nation and has a long history of hyper-segregation leading to disparate impacts. Milwaukee's African American Community suffers from the highest incarceration rates in the country, low high-school graduation rates, high eviction rates, high unemployment, and concentrated poverty. 27.5 % of Milwaukee's Latinx community lives in neighborhoods of concentrated poverty- areas where 40% or more of the population is below the poverty line- the second highest rate of concentrated poverty for Latinx communities among the nation's largest metro areas (Levine et al., 2016). Historically, this inequity has resulted in marginalized communities bearing the brunt of flawed decision making and negative impacts of environmental policies that sit squarely at the intersection of climate and health.

Given the social, environmental, and economic benefits of trees, tree planting and maintenance efforts need to account for equity, recognizing that there is uneven access to those benefits. Our City's trees have a major impact on our climate resiliency and public health, therefore, our strategies for protecting and growing our canopy are also strategies that will address environmental justice. Since the impacts of climate change are threatening our canopy and our communities, our approaches to managing that threat will need to be adaptive and our actions will need to be collective. To account for our history, and move forward equitably, we will need to move forward together.

 The Branch Out Milwaukee Campaign has been organized through stakeholder engagement, building from the collective wisdom of individuals and organizations working with trees throughout our City by conducting interviews and meetings aimed at developing a vision for the future of Milwaukee's canopy. The content of this report summarizes the outcomes of that learning in the form of research, frameworks, and strategies that will support an effective and efficient approach to fostering healthy communities and canopy in Milwaukee. We hope that this report will be a tool for shared learning for communities around the City of Milwaukee and a starting point for collective action on addressing a looming crisis.

Canopy History and Setting the Stage

The history of Milwaukee's canopy is connected to both the social, structural, and environmental history of the city. The cultural and economic timeline of Milwaukee, natural changes to our environment, and the relationships between people and place have all shaped and altered our canopy. To understand our history and move forward, it's important to take a look back at those connections, how they've shaped our city and its canopy, and where there are parallels with the crisis our canopy and communities are facing today.

The City of Milwaukee has had a significant commitment to its public natural environment since the early 1890s and by the early 1900s had a reputation for its street trees, even developing and maintaining a Milwaukee Bureau of Forestry during the Great Depression (Henyen, Perkins, & Roy, 2007; Sivyer et al., 2016). In 1956 the city of Milwaukee's had a canopy coverage of 8.7 % and City managed street trees made up 51% of the City's total canopy (Sivyer et al., 2016). As the City of Milwaukee has continued to grow, its canopy has also grown, though City managed street trees have become a smaller

proportion of the City's total canopy (Sivyer et al., 2016). Milwaukee's canopy coverage today is largely shaped by our recovery from the loss of canopy due to Dutch Elm Disease (*Ophiostoma ulmi*), which resulted in the loss of approximately 140,000 Elm trees between the 1950's to present time (Sivyer et al., 2016).

Dutch Elm Disease was introduced to the city of Milwaukee in 1956, and reached an epidemic level by the 1960s, around a decade before standard practices for management were developed in the 1970s and 1980s (Sivyer et al., 2016). Without knowledge of best management practices, the elm population in Milwaukee took a dramatic dive. Between 1966 and 1969 the City of Milwaukee was removing at least 10,000 street trees annually. Not accounting for the canopy removed on private property, Elm trees shifted from 45% of the Milwaukee's street tree canopy in 1963 to only 7% by 1986 (Sivyer et al., 2016). The impacts of canopy loss due to Dutch Elm Disease were substantial, accounting for an estimated $44M in lost storm water management services, $73.7M in lost air pollution mitigation services, $27.2M in lost energy saving services, and $8.25M in lost carbon sequestration/storage benefits between 1956 and 2013 (Sivyer et al., 2016).

Potentially the most significant impact of the sudden loss of elm trees in the City of Milwaukee was the impact to the distribution of canopy, and the capacity of the City and its residents to strategically grow and maintain new canopy in our City. Milwaukee's canopy today is a reflection of a historically limited capacity to deal with a local and regional outbreak that produced an overwhelming demand for new trees and labor. At the peak of the Dutch Elm Disease outbreak, a limited number of local landscapers and arborists were stretched thin on time and capacity, and the stock of local tree nurseries was stretched thin reducing the availability of diverse species of trees. As a result, the canopy that was planted has a low species diversity mostly consisting of ash and maple trees. With the City Forestry Division and local Landscapers/Arborists facing limited capacity to address the need to remove dying trees, the demand to plant new trees, and the need to maintain young trees, much of today's canopy grew with minimal oversight and maintenance, leaving our trees more susceptible to damage during the large storms we see increasing as a result of climate change. Conversely, private property laws prevent City workers from managing trees outside of public spaces. As a result, recovery from the impact of Dutch Elm Disease on private property was left largely in the hands of private property residents and land owners.

In 2018, the City of Milwaukee was again recognized as the most segregated city in the country (Frey, 2018), a measure signaling the deep systemic racism that impacts the lives of Milwaukee's residents. There are many studies and statistics in the City of Milwaukee citing the relationships between race and income inequality (Boyle, 2009; Levine et al., 2016; Levine, 2019; Smeeding & Thornton, 2018), health outcomes (Spahr, Gill Fellow, & Henken, 2016), incarceration (Pawasarat & Quinn, 2014), etc. There have been multiple studies in the city of Milwaukee connecting the distribution of trees on private property to studies of the urban political economy (Henyen et al., 2007; Heynen, Perkins, & Roy, 2006; Perkins, Heynen, & Wilson, 2004). Some draw a direct connection between the inequitable distribution of trees in Milwaukee's canopy and the economic, political and cultural barriers that resonate with Milwaukee's history of structural racism and hyper segregation.

At the top of this list of barriers are the affordability of trees, the costs of tree maintenance, and limited access to home ownership (Heynen et al., 2006; Perkins et al., 2004). Still into today, many of the trees that grow around Milwaukee's vulnerable communities have grown in "tree line" areas where the

responsibility of maintenance is unclear, or falls into the hands of absent land lords, often resulting in property damage and public perceptions of trees as a nuisance or liability (Heynen et al., 2006). With very little agency to plant or manage trees, residents around Milwaukee who cannot afford the costs associated with trees are un-interested in free tree or assistance programs and would rather live without an unmaintained canopy (Perkins et al., 2004).

Aside from barriers associated with the cost of purchasing and maintaining a tree, many Milwaukee residents face direct physical barriers to planting trees and enjoying green spaces. On Milwaukee's South Side, many streets are limited by a public right of way that is far too narrow to hold a fully-grown tree, and minimal yard space for tree plantings. Land cover around the Kinnickinnic River Watershed, on the South Side of Milwaukee, is nearly 97% impervious surface (Z. Driscoll, Nenn, & Rogers, 2018) meaning that planting trees and creating green spaces often first requires the removal of concrete and remediation of damaged soil, a process that is almost universally unaffordable. These barriers to tree planting present a clear environmental injustice imposed on communities who've held very little or no agency in decisions that have established barriers to tree planting. Researchers looking at these circumstances and the location of green spaces in Milwaukee and other cities around the US, have cited segregation and structural racism as an agent in decisions that have shaped access to green space and urban vegetation for marginalized communities (Henyen et al., 2007; Heynen et al., 2006; Jesdale, Morello-Frosch, & Cushing, 2013; Nesbitt, Meitner, Girling, Sheppard, & Lu, 2019; Watkins & Gerrish, 2018).

Segregation in Milwaukee has led to the development of many problematic structures, stifling the diversity of decision makers throughout our city's history. The impacts of tree loss and management due to Dutch Elm Disease shaped Milwaukee's urban canopy, as well as the relationships between community and canopy around the City of Milwaukee. While facing an overwhelming amount of demand for canopy maintenance, for the first time in history, in the 1950s and 1960s Milwaukee's City Forestry Division began hiring African American laborers into low paid seasonal positions as boulevard maintenance workers (Henyen et al., 2007). It was not until 1993, after a series of court cases from members of the *United Association of Black Landscapers*, Eddie Martin, Thomas H. Wynn Jr., Harold Burris, Lloyd Mayweather, Jose Rosales, Charles Burton, and Rufus Powell, that the Forestry Division promoted an African American man into a management position (Henyen et al., 2007 & United States Court of Appeals Seventh District, 1990). Until this point, a woman had never been promoted either. The lack of leadership from and engagement with marginalized communities in Milwaukee has impacted the management and distribution of greenspaces across the City of Milwaukee (Henyen et al., 2007). Today, the impacts of that disinvestment and disengagement are visible when looking at the accessibility of healthy trees and greenspaces in areas of Milwaukee's central city.

Current Conditions

In the Great Lakes Region climate change has significantly shifted average temperatures, precipitation, and heat exposure, and those trends are predicted to continue to increase. Extreme rainfall events have increased over the last century, producing flooding, erosion, declining water quality, and negative outcomes for transportation, agriculture, human health, and infrastructure. Increased heat wave intensity and frequency, increased humidity, degraded air quality are all growing in extremity and threatening public health (NOAA, 2019). Climate change is benefiting the range of habitat for invasive species, and reducing quality habitat for many native species. The composition of forests in the Great

Lakes Region is expected to shift northward, with tree species migrating from the south gaining advantage as the climate shifts. All of these outcomes threaten the largest burden on our region's most vulnerable and underserved communities. On a global scale, trees are gaining momentum as a solution to the impacts of climate change, and on a local level the benefits of trees will certainly mitigate some of the predicted outcomes of a changing climate.

The City of Milwaukee's canopy coverage has generally increased each decade since the early 1950's (Sivyer et al., 2016). The City currently has canopy coverage over 25.55% of its land cover, compared to Milwaukee County which has a canopy coverage of 33.89% (WDNR, 2019). Milwaukee's canopy coverage today has recovered from the loss of trees to Dutch Elm Disease, even increasing the number of trees on the landscape (Sivyer et al., 2016). Depending on the location of that canopy, the City's forest is managed by a range of stakeholders including government departments, private property owners, non-profit organizations, and private tree care businesses. The remaining land cover in the City of Milwaukee is .76% water cover, .58% wetland cover, 21.95% grass/herbaceous cover, and 51.17% impervious surface (WDNR, 2019).

A study conducted in 2008, and updated in 2014, by i-Tree looked at data collected from 220 field plots around the City of Milwaukee and analyzed Milwaukee's forests using the US Forest Service's Urban Forest Effects model. The study found that Milwaukee has an estimated canopy of around 3,315,000 trees, 67.6% of which have a diameter less than 6 inches (i-Tree, 2014). Milwaukee's canopy in 2014 was estimated to remove 596 tons of air pollution per year with an associated value of $18.8 million, sequester around 14,100 tons of carbon per year with an associated value of $1.11 million, reduce storm water runoff by an estimated 785,000 cubic meters a year with an associated value of $1.85 million, and reduce energy related costs to residential buildings by $1.31 million per year (i-Tree, 2014).

Milwaukee's urban canopy consists of at least 116 species (WDNR 2018) of trees and has distinct differences in species diversity in different locations based on who is responsible for planting and maintaining trees geographically. Overall, the City of Milwaukee's ten most significant tree species, based on total composition and leaf area, are european buckthorn, norway maple, boxelder, green ash, white ash, american elm, honeylocust, american basswood, silver maple, and sugar maple (i-Tree, 2014). Species diversity, measured by percent composition, and leaf area are two distinct but important measures of canopy. Diverse communities of trees are more resilient to changes in habitat, changes in climate, or outbreaks of invasive pests, and can provide better services to a healthy functioning ecosystem. Leaf area generally increases as trees grow larger. Trees with a greater leaf area generally provide a larger proportion of benefits such as water retention, carbon sequestration, pollution remediation, and shading. Invasive species such as European Buckthorn, and other native plants such as Boxelder or Norway Maple, with prolific growth rates have dominated private property, vacant lots, public parks, and other green spaces with low maintenance. European buckthorn, a well-known invasive species in our region that disrupts local ecosystems and takes away habitat from other native species, makes up 23.3% of Milwaukee's tree population, but only 5.5% of its leaf area (i-Tree, 2014). Norway maple makes up only 6% of Milwaukee's tree count (i-Tree, 2014), but makes up 40% of Milwaukee's street tree canopy (WDNR 2018), and because of the history of planting and maintenance associated with Milwaukee's street trees norway maple has grown to account for 21.2% of the City of Milwaukee's total leaf area (i-Tree, 2014).

Today urban planners and foresters look to find the "right tree for the right place", assuming that different species of trees will be uniquely successful and beneficial based on their location and stakeholder interests. However, historically this has not always been a best practice for the tree care industry. Many of the trees planted in Milwaukee were planted prioritizing what was available or affordable, rather than considering the importance of species diversity, tree mortality, or tree dimensions and required maintenance. As a result, our urban forests are increasingly at risk for damage from large storms or invasive pests, and require increasing oversight for maintenance. One example is of trees planted under or in close proximity to power lines. The Wisconsin Electric Company (WE Energies) has 10 full time foresters on staff, but contracts more than 300 arborists throughout the year to do maintenance on trees that threaten to damage power lines. WE Energies works with residents, the City Forestry Department, Milwaukee County Parks and other stakeholders to ensure that there is planned maintenance for trees that threaten to damage power lines, and that any new trees are selected and planted using best practices that reduce the risk of future damage. Even with the best intentions, and capacity, foresters depend on local nurseries to provide trees that can maximize the benefits of canopy in unique locations. Following the great recession, our region saw a reduction in the number of local tree nurseries, and some scaling back of planted stock at existing nurseries (Sivyer et al., 2016). However, with the growing demand placed on tree nurseries by residents and municipalities dealing with invasive pests, local nurseries are confident that they will continue to be able to offer diverse species.

Across the region tree diseases and invasive insects such as Dutch Elm Disease, the Asian Longhorned Beetle, and the Emerald Ash Borer have had major impacts on the health of forests. In 2014 i-Tree assessed that there were eight known pests within Milwaukee County, four within 250 miles of Milwaukee County, and four within 750 miles of Milwaukee County (i-Tree, 2014). Forest pests tend to have specific host species, and therefore their potential impact differs based on the diversity of trees in different locations. The City of Milwaukee lost over 140,000 Elm trees with the outbreak of Dutch Elm Disease in the 1950s. Currently Milwaukee's forests are facing another crisis, the Emerald Ash Borer, an invasive pest threatening to eliminate the entire regions ash tree population. Ash trees (*Genus: Fraxinus*) currently make up 16% of trees managed by the city of Milwaukee (Approximately 33,000 trees) and 17.4% of the City of Milwaukee's total tree count, with a structural value of over $200 million (i-Tree, 2014; Sivyer et al., 2016). Though the City of Milwaukee has taken amazing strides to use best practices for delaying canopy loss and reducing the immediate impacts of the Emerald Ash Borer, there is an overwhelming demand for the maintenance, removal, and treatment of dead and dying ash trees across the City of Milwaukee. The City of Milwaukee and private arborists across our region are facing a labor shortage, with growing demands for tree maintenance, tree injections, tree planting, and tree removals.

To address a growing need for professional arborists, this year the state of Wisconsin will be the first to operate a statewide arborist apprenticeship program. The program was formed by the Wisconsin Bureau of Apprenticeship Standards, the Wisconsin Arborists Association, and a Taskforce organized in 2014 to design a pilot program that launched in 2016 with two regional employers and around 4-6 participants. In 2019 the program has grown with connections to five regional employers, and around 35 participants. The apprenticeship program runs for a minimum of three years, and consists of on the job training as well as classroom education. Participants in the Wisconsin Arborist Apprenticeship Program must be 18 years of age, with a valid driver's license, a High school Diploma or GED, and an employee sponsor with an approved Wisconsin Arborist.

In 2017 Wisconsin's unemployment rate hit 2.9%, the lowest in state history. The less popular statistic, is that the unemployment rate for black workers in Wisconsin at that time was 9.6% compared to 2.6% for white workers (Cornelius 2018). In 2017, in the City of Milwaukee's 53206 zip code, 49.7% of all working age men remained unemployed, and over one-fifth of employed residents reported income below the poverty level (Levine, 2019). To be intentional about attempting to address the realities of how entrenched hyper segregation has created barriers to access for living wage careers within communities of color around the City of Milwaukee, we must be intentional about creating equitable and accessible pathways to employment. One growing success story is the partnership between Senator Lena Taylor's Love and Faith Initiative and the Northcott Neighborhood House, who have launched Wisconsin's first Arborist Pre-Apprenticeship Program. This program would accept applicants with little background or exposure to urban forestry, and build the skills and certifications necessary to pursue a position with a regional employer with access to the Wisconsin Arborist Apprenticeship Program. Participants will be paid throughout their training through Wisconsin's Transitional Jobs Program, and enter directly into a position with a regional tree care company. In partnership with organizations around the city and the state, the program is launching in the summer of 2019 with 15-20 participants and connections to eight regional employers.

Private Property

A majority of urban trees in Wisconsin, sixty-nine percent, grow on private property (Thostenson, Witzling, Shaw, & Knoot, 2019). In 2013, in the City of Milwaukee, street trees made up only 23% of the City's total canopy (Sivyer et al., 2016). Following the canopy loss that resulted from the impacts of the Dutch Elm Disease, the sprawling canopy that once lined neighborhoods around Milwaukee no longer exists. However, Milwaukee's canopy has continued to grow to surpass levels recorded before the spread of Dutch Elm Disease (Sivyer et al., 2016).

In the place of that canopy, property owners with the resources to afford the price of purchasing and planting new trees have invested in a broad diversity of trees available through retail. Milwaukee's canopy today is unevenly distributed, and consists of a mix of native and non-native species whose composition is driven by consumer interests, and the availability of tree species sold at local nurseries. In some Milwaukee neighborhoods the neglect of trees that have grown on property lines with unclear ownership/responsibility have resulted in unexpected canopy growth, generally of trees with prolific growth rates or invasive species like Buckthorn. With homeowners and residents unwilling or unable to invest in the maintenance of these trees, they commonly grow to become unmanageable. Still in other neighborhoods, such as on Milwaukee's Southside, the proximity of homes, and the amount of impermeable pavement make it nearly impossible to plant or grow trees on private property.

The responsibility for planting and maintaining trees on private land falls into the hands of property owners. Though that responsibility is held by the land owner, the benefits and consequences of trees on private property certainly impact more than the property owner themselves. Large trees can provide shading and cooling for multiple neighbors, but without proper care can also impose damage to neighboring property. In 2017, 40.32% of total Milwaukee households were listed as rental households (US Census ACS Data 2017). Renters face unique challenges and barriers related to tree care, namely that trees on their property are not their responsibility and may not be of any interest depending on the length of their lease. Some research done in Milwaukee has suggested that the high mobility of renters in Milwaukee, is a likely cause for Milwaukee residents' disconnection from free tree planting opportunities, recognizing that there are distinct disincentives such as increased property value and

higher maintenance needs that are associated with additional trees on rental properties (Perkins et al., 2004). Conversely, these and other cost savings associated with heating and cooling costs, could be distinct incentives for private property owners to plant trees. However, research and stakeholder interviews conducted while organizing the Branch Out Milwaukee Campaign suggest that rental property managers in the City of Milwaukee are commonly more apt to neglect tree maintenance or remove trees entirely rather than pursue these incentives and their benefits (Heynen et al., 2006).

It is not uncommon that trees on private property are associated with property damage to roofs, vehicles, buildings, and sidewalks sometimes even onto neighboring properties. Theses outcomes are often the result of low attention to the maintenance of trees, improper planting locations, and damage from frequent or intense storms. Often tree care services on private property must be contracted through private tree care companies, though these services can be pricey and are often reoccurring. To further amplify this problem, the Emerald Ash Borer has placed tremendous pressure on property owners and private tree care companies to manage and eventually remove Ash trees across the City of Milwaukee and the region. The price of tree removals is a significant barrier for most residents, however, with such a large number of dying ash trees in Milwaukee's canopy tree care companies are being drawn thin with tree removals and tree injections. With such high demand, some tree care companies are changing their models to better suit landscaping projects rather than selling, planting, and maintaining single trees. This change leaves homeowners to navigate maintenance, as well as connect with tree nurseries on their own to receive trees. The association of tree removals, under maintained trees, the cost and responsibility of trees, and tree damage all impact community perspectives on the costs and benefits of tree canopy. Most research into the perspectives of landowners on efforts for reforestation in urban areas have cited these negative associations with privately owned trees and canopy history as common barriers to tree planting efforts(Christine E. Carmichael & McDonough, 2018; Heynen et al., 2006).

Street Trees

The City of Milwaukee's Department of Public Works is in charge of street tree planting, and maintenance of the approximately 189,117 street trees currently in Milwaukee (WDNR 2018). The City of Milwaukee has the goal to "Maintain a fully stocked tree canopy that maximizes community and environmental benefits and is safe for public use and enjoyment" (Bell, Carter, Christianson, & Ivy, 2018). Milwaukee's street trees are around 45% Maple, 16% Ash, 10% Locust, and 29% spread between at least 56 other genera (WDNR 2018). The maintenance of those trees, removal of dying trees, and planting of new trees falls solely on the Milwaukee Department of Public Works Forestry Division. The Forestry Division manages vegetation on 121.8 miles of boulevards, 57 playgrounds, 59 green spaces, 20 designated municipal properties, and 20 downtown above ground planters.

The City Forestry Division has been a regional leader in assessing and managing the threat of Emerald Ash Borer. Using our knowledge of the impacts of canopy loss from Dutch Elm Disease, the City Forestry Division has designed a strategy for delaying the loss of canopy due to Emerald Ash Borer. By injecting Ash trees, the lifespan of the tree can be extended, allowing the Forestry Division to focus on tree removals and plantings in the highest risk areas rather than clear cutting the entire Ash population. The City of Milwaukee is responsible for 33,000 Ash trees, 16% of the entire street tree population. Their approach to addressing this problem will grant them time to come up with diverse, adaptive, and climate resilient strategies for reforesting the lost canopy.

The City of Milwaukee's forestry division currently faces significant financial barriers, limiting its capacity to address the maintenance needs of the city's street trees. Between 2016 and 2019 the City Forestry Division has dramatically reduced its projected goals for tree pruning around the City of Milwaukee, and in multiple years struggled to meet those goals. In 2016, the City Forestry Division budget projected pruning for 32,000 trees in 2017 and 2018. In 2017 the City Forestry Division pruned 24,018 trees and projected that it would prune only 18,000 trees in 2018, and 23,000 in 2019 (Bell, 2019; Bell et al., 2018; Robinson et al., 2017). These projections have proven to be ambitious in some cases, and difficult goals to meet with the Forestry Division's current capacity. In 2019 the City's tree pruning cycle moved from eight years to ten, reducing $620,000 in salaries and removing twelve full time employees (Bell, 2019). This news comes after a city-wide campaign for recruitment into the City of Milwaukee's Wisconsin Arborist Apprenticeship Program, where hundreds of applications from around the City were received. With 33,000 Ash trees to maintain, remove and replace, approximately 156,117 trees of other genera to maintain, reduced funding, a loss of twelve full time staff, and increasing impacts from climate change the City Forestry Division has exceeded their capacity with the resources they currently are granted.

Vacant Lots/Community Orchards

Vacant lots are neglected parcels of property with no buildings. Land can be vacant because it is a non-building area such as a flood plain, or because it is temporarily vacant where a building has been demolished and the costs of restoring and rebuilding that property have not been matched (City of Milwaukee, 2013). In the City of Milwaukee, there are approximately 6,447 vacant properties owned by the City, County, or private owners. Approximately 245 of the vacant properties not owned by the City of Milwaukee are half an acre or larger, 142 are one acre or larger, and 39 are five acres or larger (City of Milwaukee, 2018). The City of Milwaukee owns and maintains approximately 3,300 vacant lots, and 1,200 improved lots with structures. The maintenance of those lots (Mowing grass, pruning trees, shoveling snow, etc.) is the responsibility of the City of Milwaukee's Department of Public Works. However, through coordination with the City of Milwaukee's Department of City Development, there are many community and nonprofit organizations, private residents, and businesses that are utilizing Milwaukee's vacant lots to beautify community spaces.

Through many city departments, and coordination with a number of community and nonprofit organizations, the City of Milwaukee is actively looking for community led approaches to remediating vacant lots around the city. City departments and initiatives such as the Neighborhood Improvement Development Corporation and the HOMEGR/OWN Initiative have helped to facilitate a transition in how the city views the development of vacant lots to foster community visions for neighborhood improvements. Partners such as Groundwork Milwaukee, Walnut Way, Victory Garden Initiative, and many more have been instrumental in facilitating the transformation of vacant lots around the city into community designed spaces including community orchards, outdoor classrooms, community gardens, parks and playgrounds, and many types of green infrastructure. The responsibility for maintaining and developing those lots is agreed upon by the city and interested stakeholders, and then left in the hands of those stakeholders to navigate.

Thanks to the coordination from community partners, and action from communities around the City of Milwaukee, over 57 community orchards have been planted around the City of Milwaukee (GroundWork Milwaukee 2019). Similar to community gardens, community orchards provide a shared community space and access to fresh produce. Out of 297 neighborhoods in Milwaukee, 113 didn't have

access to fresh food in 2018. The Hunger Taskforce is quoted as saying that there are food deserts in 24 of Milwaukee County's 35 zip codes (Rook 2018). Community orchards around Milwaukee are home to 2005 trees, and are maintained and harvested by communities and community organizations around the city. Unfortunately, there is a barrier around maintenance of community spaces on vacant lots.

Though it is very accessible to find funding and support to develop vacant lots in the City of Milwaukee, it is much more difficult to find funding or support for ongoing maintenance. Though community orchards are an asset for community wellbeing, they require significant maintenance and upkeep. Fruit trees can be messy, pests are common, and trees in general require constant care until they are mostly grown. The responsibility for maintenance ultimately falls into the hands of community volunteers, and as a result many community orchards around the city have become neglected due to busy schedules and minimal anchor support. Nonprofits interviewed through the Branch Out Milwaukee Campaign have significant programs to maintain communication with stakeholders who have organized community projects. However, even with these connections maintenance can fall apart as people move, or become busy with their own work. It is uncommon for nonprofits to be able to find funding to maintain previously developed sites on their own, and city departments have very little capacity to assist with maintenance. Further, as trees grow and require professional maintenance, those services must be contracted out. These kinds of additional costs can be a significant barrier for community volunteers, and though there are city programs with the potential to assist with these costs, navigating those applications for funding can be time consuming and difficult to navigate for volunteers.

Parks

Milwaukee County is home to around 158 public parks and parkways, around 15,000 acres, that have been managed by Milwaukee County Parks since the early 1900s. The City of Milwaukee's Department of Public Works City Forestry and Sanitation crews also maintains a system of 62 outdoor recreation sites, classified as either playgrounds or passive parks. At different points in the history of our parks Milwaukee has gained recognition as the city of parks, for a long-standing commitment to its public greenspaces.

Milwaukee's Parks System feature some of the City of Milwaukee's longest standing woodlands, wetlands, wildlife areas, and natural waterways. The parks exemplify significant historic, scenic, scientific, and recreational value for the city and its residents. In addition to the long-term management of natural areas on park land, Milwaukee County Parks currently coordinates the maintenance of 20,261 trees throughout the County's park system, including approximately 3,403 Ash trees (WDNR, 2018). Natural areas in Milwaukee County Parks are managed through long term park and open spaces planning efforts, that dedicate management strategies for native ecosystems and public spaces.

Today, the capacity of Milwaukee County Parks is threatened by extreme budget cuts limiting oversight of green spaces, programs, and facilities. As recently as the 1970s Milwaukee County Parks employed over a thousand full time staff, in 2017 approximately 200 people oversaw all park programs (Bence 2018). In the face of frequent storms and the Emerald Ash Borer crisis, Milwaukee County Parks is mostly focused on cleaning up after storm damage and maintaining or replacing dead and dying ash trees. Despite a vision for long term maintenance, planning, and management, with limited capacity the priority for Milwaukee County Parks is safety. To more efficiently manage hazards fostered by delayed maintenance, Milwaukee County Parks has developed priority zones for maintenance for parks around the county. By tracking the routine maintenance done on trees in each park and assessing the health of

each park's canopy, park staff are more readily able to coordinate their capacity and resources to address the most pressing priority maintenance needs throughout the parks canopy.

With little capacity for routine maintenance, or extensive landscaping, the county parks system is facing challenges with tree survival and competition from invasive species. Trees are planted in county parks through a number of programs in locations outlined by the County Parks System's long-term management plans. County Parks staff generally coordinate plantings and maintenance in wooded areas, and of larger trees throughout the parks, however there are commonly partnerships coordinated with nonprofits and community groups. Often the County Parks system relies on partnerships with community volunteer "Friends of the Parks" groups, coordinated by the Milwaukee nonprofit The Park People. Friends of the parks groups often host invasive species removal events, working to eliminate common invasive species, such as buckthorn and garlic mustard, that are taking over Milwaukee's urban forests. Young trees, or "whips", planted along Milwaukee's rivers or in wooded areas are expected to have a low survival rate because of competition from invasive species such as buckthorn, prolific species such as sugar maple, and predation from deer and other native wild life. Due to their high mortality rate, tree "whips" are planted densely at higher per acre numbers than would otherwise be desirable to counter the threat from herbivory and competition. Larger tree stands, and trees along public corridors are commonly planted and maintained by County Park staff to ensure that trees are properly planted and pruned. While larger tree stands generally have a higher survival rate, they are a larger investment, and to grow healthily require oversight from a trained professional.

Passive parks and playgrounds maintained by the City of Milwaukee often face similar barriers to maintenance, and funding. However, there have been some major investments in City maintained parks and trails largely driven by grants and campaigning in partnership with local nonprofits and community groups. These partnerships have had amazing success boosting community engagement in park planning, programs and maintenance.

Program Opportunities

The crisis (Dennis, 2019) that we are facing in Milwaukee is complex. It involves culture, environmental health, public health, economic and social inequality, and many other systems and structures that are well rooted in history. The history of segregation in Milwaukee has laid a destructive foundation, dividing our city for generations, and producing inequitable outcomes that have a greater impact on marginalized communities. Many decisions that have shaped our city have been made in silos, and the outcomes of those decisions have further limited opportunities and pathways for residents hoping to shape their communities. To move forward, strategies addressing these complex systems will need to be intentional about fostering equity, and understanding/navigating power dynamics. Our actions to address the complexity of this issue will need to be orchestrated considering the relationships that exist between unique systems and structures. Our actions will need to be adaptive, understanding that change takes time and trust, and that our solutions today will shape the choices available to future generations. To address a problem as large as hyper-segregation or climate resilience we will need to consider how our actions, large and small, can strategically impact those larger problems. When we consider Milwaukee's canopy in this lens, moving forward becomes much more complicated, and so much more important.

Through research, and the input of partners and stakeholders around Milwaukee, we have come to understand how the history of Milwaukee has established a canopy that is not distributed equally or

equitably, and that, that distribution is only further exacerbated by the loss of canopy due to a changing climate and invasive pests such as the Emerald Ash Borer. We know that the benefits associated with trees, mean that the loss of or lack of canopy in neighborhoods around Milwaukee increase vulnerability to heat, food access, climate change, flooding, poverty, stress, and a variety of health outcomes. We understand that there will need to be a significant effort to boost employment, and funding for urban forestry efforts, and that currently the resources and capacity supporting Milwaukee's forestry programs will not be sufficient to properly address the impacts of Emerald Ash Borer or prepare the city's communities and forests for the impacts of climate change. We have come to understand that throughout Milwaukee's history, the resources and opportunities associated with Milwaukee's canopy have been inaccessible to marginalized communities around our City. For all of these reasons and more, we recognize that our approach to the future of Milwaukee's canopy is an issue of environmental justice.

The Branch Out Milwaukee Campaign is an opportunity to be proactive about addressing a multidimensional crisis in Milwaukee linking community health, environmental health, and sustainability. A just future for Milwaukee's communities will mean equitable distribution of the environmental and health benefits of trees as well as equitable involvement in decision making processes related to Milwaukee's canopy. We have learned through our research that what we are experiencing now with Emerald Ash Borer has happened before! When Dutch Elm disease hit the City of Milwaukee, we had an opportunity to foster equitable employment pathways and diversify our workforce of urban arborists; we had the opportunity to plant diverse species of trees and engage stakeholders to design new green spaces around the city; we had the opportunity to educate residents on the value of trees and build relationships throughout the City of Milwaukee between departments, neighborhoods, and organizations. We had the opportunity, but we didn't know any better, today we have a second chance. Recognizing that the inequitable distribution of our City's canopy is a complex multidimensional problem with social and environmental significance; to have impact, we can capitalize on collective thinking, planning, and action. By relying on community leadership and support from diverse stakeholders, we can build unique solutions that can adapt to a changing climate and canopy. By focusing on equity and environmental justice, we can change the narrative for future generations, and we will.

Strategy

Collective Impact Framework

Milwaukee Water Commons works under three organizing frameworks: the commons, environmental justice, and collective impact. As a result, the Branch Out Milwaukee Campaign has been organized to advocate for the rights of the commons, to do so centering on environmental justice, and using a collective action approach. To be successful, this process requires continuous community engagement, recognizing that change requires time, intentionality, and trust. Collective action -or collective impact- is not a new concept, though it is only beginning to gain traction in urban forestry initiatives through the work of groups such as the Portland-Vancouver region's Intertwine Alliance, Seattle Washington's Emerald Alliance, and Denver Colorado's Metro Denver Nature Alliance. Distinct from collaboration, the Intertwine Alliance has described collective impact as, " the commitment of a group of actors from different sectors to a common agenda for solving a complex social problem"(A. N. Driscoll & Riles, 2015).

Many have suggested that in order to produce meaningful results from collective action, there are five conditions that must be met:

1) **Common Shared Agenda-** All participants have a shared vision for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions.
2) **Shared Measurement-** Collecting data and measuring results consistently across all participants ensures efforts remain aligned and participants hold each other accountable.
3) **Mutually Reinforcing Activities-** Participants' activities must be differentiated while still being coordinated through a mutually reinforcing plan of action.
4) **Continuous Communication-** Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and create common motivation.
5) **Backbone Support-** Creating and managing collective impact requires a separate organization (s) with staff and a specific set of skills to serve as the backbone for the entire initiative and coordinate participating organizations and agencies.

This report is intended to be a first step towards: understanding and articulating the need for a collective action approach to tree planting and maintenance, documenting the perspectives of stakeholders from around the City of Milwaukee concerned with the benefits of a healthy canopy, and proposing approaches for acting collectively to remedy the complex multidimensional problems associated with Milwaukee's canopy. To build on these three areas, in this section of the report, we will attempt to summarize the input from stakeholders and community from around Milwaukee who have participated in meetings and interviews over the course of a year with the intention of designing a meaningful strategy for a collective action tree planting and maintenance program called the Branch Out Milwaukee Campaign. As a reflection on the conditions of organizing a collective action campaign, this report will be a first step towards organizing a common shared agenda, based on information gathered from a diverse network of partners from different sectors.

Input from partners engaged with the Branch Out Milwaukee Campaign has led to the development of a series of frameworks and goals for organizing a collective action program around tree planting and maintenance in Milwaukee. Partners engaged with the Branch Out Milwaukee Campaign are committed to seeing the development of strategies for tree planting and maintenance that are:

Frameworks

- **Equitable:** Solutions and outcomes resulting from this work should benefit all of Milwaukee's residents, particularly those who are burdened by the brunt of racial, environmental, and economic injustice. Equity refers to fair and just inclusion, free from bias and favoritism. This means that our approaches must take every step to ensure that everyone has the opportunity to participate and prosper from this program, the work of its partners, and the outcomes of our energy together.
- **Sustainable:** Both environmentally and socially sustainable. Facing the looming threat of climate change, and the dynamically adaptive history of social inequality, the solutions that we come up with today need to consider the importance of finding outcomes that will be meaningful for future generations.
- **Multi-Dimensional:** The approaches taken by this program need to consider diverse perspectives, accounting for the role of our work in impacting or maintaining structural and

community level systems, and whenever possible maximizing social, economic, and environmental benefits.

- **Respectful:** Going into this work, our approaches need to be intentional about interpreting and navigating power dynamics, respecting the commons by honoring both people and place. Our actions and solutions should recognize diverse cultures and lived experiences, empower all types of knowledge and wisdom, and remain humble to our place in social and environmental history.

To be successful in organizing under these frameworks, and acting collectively, there must be a set of goals that is shared by all participants. Though all of the stakeholders who participated in the creation of the Branch Out Milwaukee Campaign had a vested interest in the benefits of trees in our city, the approaches, barriers, and outcomes that each participant envisioned were much more diverse and dynamic. Though some partners were interested in maximizing tree canopy, there were still disagreements on how to measure the progress of that goal, or whether we should be focused on tree planting at all instead of the maintenance of our existing canopy. When one partner was focused on planting trees along Milwaukee's Rivers to benefit erosion and water quality, others were interested in creating community orchards, or planting shade trees in urban heat islands. Even approaches for how to plant or maintain trees differed between partners, whether organizing large groups of volunteers, or creating career pathways for a new wave of urban arborists. What became quickly apparent was that forced partnerships and collaboration could ultimately undermine our individual goals, and take the momentum out of our shared interests.

The beauty of collective action is that with shared goals, that overarch our individual or organizational interests, we can share capacity and build upon each other's work to maximize our collective outcomes. By pursuing multiple coordinated strategies between diverse stakeholders, we can ensure that our approach is both efficient and effective. After a year of conversations with partners, and stakeholders, common themes and goals began to be articulated. Taking into account the diversity of interests amongst our projects' stakeholders, the Branch Out Milwaukee Campaign's goals were established using a systems thinking approach to synthesize the groups' conversations around their personal vision for the approaches, goals, and outcomes of our program.

Goals

1. **To grow a sustainable canopy, that will support a healthy community.** This program's partners intend to create approaches and strategies that will support a resilient canopy and benefit communities across Milwaukee for generations to come.
2. **To improve communication and collaboration between diverse stakeholders.** This group recognizes that to meet our goals and frameworks, we will need to do so together. It is our intention that this program is a tool for creating more genuine connections across our city, fostering collaboration and creating new and stronger networks.
3. **To share resources, share power, and share benefits.** To move forward efficiently and effectively we will need to focus on engagement and inclusion, recognizing the value of collective wisdom. Sharing the inputs and outcomes of this process will build on the strengths of

a diverse pool of partners, and empower unconventional leaders to speak truth to our vision for maximizing the benefits of Milwaukee's canopy.

These broad goals are meant to provide a foundation for the detailed approaches that will be designed by project partners and communities around the City of Milwaukee. By establishing this shared language, and developing key frameworks for our actions, work being done in distinctive programs or contributing to niche aspects of these goals can still build on the larger mission of our collective action. Simultaneously, these pieces should provide clarity to partners working in multiple capacities, when their programs do, or do not, intersect with the actions and interests of the Branch out Milwaukee Campaign. This foundation can also be a starting point for conversations between project partners, interested stakeholders, and community members looking to discuss problems, solutions, and opportunities.

Community Engagement and Power Dynamics

Community engagement and strategies for navigating power dynamics are essential to meeting canopy goals. Initiatives lacking intentionality in these areas experience a common barrier to the success of tree planting and distribution programs, as well as the sustainability of tree maintenance (Christine Elisabeth Carmichael, 2017; Heynen et al., 2006; Perkins et al., 2004). Without guidance and leadership from communities living in the neighborhoods where trees are planted, the outcomes cannot account for, support, or effectively benefit those communities and their interests. The Branch Out Milwaukee Campaign has been organized and energized through the engagement of stakeholders and partner organizations from around the City of Milwaukee, however, the actions of this program will ultimately impact the lives of Milwaukee's communities and residents. That is why it is critical to state that actions taken under the frameworks and goals of the Branch Out Milwaukee Campaign will not, and cannot, move forward without the leadership and guidance of communities throughout our city.

Environmental justice for Milwaukee's communities will mean equitable distribution of the environmental and health benefits of trees as well as equitable involvement in decision making processes related to Milwaukee's canopy. To be intentional about benefiting our city's neighborhoods equitably, we will need to engage with each of our city's communities, and recognize that every neighborhood has unique needs and barriers related to canopy, public health, and wellness. The network of stakeholders engaged with the Branch out Milwaukee Campaign harbors significant institutional knowledge on best practices for tree planting, tree maintenance, and climate resilience/adaptation, as well as community leaders and advocates focused on the wellness of Milwaukee's communities and residents. However, when navigating the best approaches to tree planting and maintenance in Milwaukee's neighborhoods, it is critical that we empower community leadership and engagement in developing the outcomes of our programs.

In order for our programs and approaches to truly embrace our shared frameworks, our strategies need to respect and support the leadership of the communities that we hope to benefit. As we continue to learn by building new collaborations and communicating more broadly, there will be barriers that our network will need to navigate collectively. In order to engage problems that are multi-dimensional, we will need to work smarter not harder, supporting the strengths of our partners and lending capacity where, when, and however it is most productive. These efforts require that the most powerful institutions respect and engage the wisdom and guidance of unconventional leaders, and that actions

taken by individuals or organizations account for their role in supporting the wellness of the community especially those in the community with the least agency and power to voice their perspectives.

Studies done on urban forestry efforts in Detroit found that residents and tree care professionals commonly have distinct heritage narratives connected to neighborhood trees (Christine E. Carmichael & McDonough, 2018). Though the benefits of trees are appealing, a lack of tree care, or unhealthy relationships with tree care professionals and neighborhood canopy is an understandable barrier to planting new trees. There is increasing research in the City of Milwaukee citing the connection between social and environmental injustices (Cutts et al., 2018; Henyen et al., 2007; Heynen et al., 2006; Hornik, Cutts, & Greenlee, 2016; Perkins et al., 2004). Further there is an established connection between cultural perceptions of trees and the impacts of hyper segregation and structural racism in the City of Milwaukee (Henyen et al., 2007; Perkins et al., 2004). Recognizing the complexity of community and canopy relationships throughout history, work happening within this program will need to be transparent about the history of our canopy, and intentional about overcoming the barriers that have been structured into the lives of communities around our city. It is not enough for programs and initiatives entering vulnerable communities in our city to offer benefits and not pursue solutions. For the Branch out Milwaukee Campaign to be successful in meeting its goals and frameworks, projects happening around the city of Milwaukee will need to learn from Milwaukee's residents and engage diverse leadership, providing support for community defined priorities and fostering both community and canopy health.

Consistent with our program's framework's, our actions should also be accountable to our canopy, our environment, and to future generations. Though there are no direct advocates or voices for these perspectives, all of the actions taken by this program's partners should be conscious of our shared sustainability and our connections to the planet. Building in policies around adaptive management, collective decision making, and the use of best practices can all be tools for approaching this goal.

Tree Planting and Tree Maintenance

Growing an equitably distributed tree canopy in Milwaukee has the potential to benefit the health of communities and ecosystems around the City. Shade trees planted strategically would minimize or eliminate the threat of urban heat islands. Well maintained community orchards and residential fruit trees would improve the accessibility of fresh produce, and could create economic and employment opportunities. Storm water trees reduce urban flooding, filter water entering Milwaukee's rivers, and slow the flow of water into the City's storm water infrastructure reducing the likelihood of sewer overflows. Trees around the city would improve air quality, benefiting human health, and removing airborne particulates. A biodiverse canopy would remain resilient despite a changing climate, sustaining habitat for native ecosystems, while also removing carbon from the atmosphere.

It is clear that to reach these benefits, we will need to mobilize to increase Milwaukee's tree canopy. Around the country there are ambitious goals for tree planting, including million tree benchmarks and canopy coverage goals. However, as things stand, there is no framework for building the capacity or resources to manage a growing canopy in the City of Milwaukee. One point that has risen from our research and from discussions with stakeholders from around the City of Milwaukee is the importance of creating strategies and assigning funding for both tree planting and tree maintenance. This section will begin to explain some best practices we've learned for tree planting and maintenance, and will frame the need for both components based on the vision of the Branch Out Milwaukee Campaign.

Tree planting and maintenance are an investment and a commitment. Through local nurseries, a large diversity of trees and prices are available, ranging in price from tens of thousands of dollars to ten dollars, and in some cases free. A number of nonprofit organizations in Milwaukee offer free tree programs, advertising specific species of trees that are available through donation. Each year, Greening Milwaukee, or Keep Greater Milwaukee Beautiful, is granted around 8,000 trees to distribute. However, most years only around 100 residents from Milwaukee request a tree. In some cases, this is due to the types of trees that are available, personal aesthetics, and even a lack of awareness of or access to free tree programs or plantable spaces. However, a large barrier to tree planting is the amount of time, effort, and additional knowledge that is required to plant and maintain a tree in the City of Milwaukee.

In order to plant a tree, the first step is to choose the right tree for the right place. The first thing to consider is the space where the tree is being planted. Before digging any holes in the State of Wisconsin it is a requirement to call diggers hotline (800-242-8511), a service that looks for existing pipes and underground infrastructure that might be damaged while digging. Size constraints (Height/depth and width for both branches and roots), underground plumbing, sun exposure, tolerance to road salt, and soil health are all important considerations for choosing the right tree and planting location. Due to the legacy of construction, deconstruction, and contamination in Milwaukee, healthy soils are hard to come by. Access to healthy composted soils is ideal when planting trees, however even when trees are based in composted soils, choosing to plant trees that are not tolerant to urban soils can ultimately damage trees as they grow past that base. Some useful tools for narrowing the search for the right tree are the iTree Species project (https://species.itreetools.org/), and the iTree Design project (https://design.itreetools.org/), which can help identify tree species and planting locations that maximize any desired tree benefits. Once a tree and a planting location are selected, the tree will need to be transported to the planting location. Even with access to transportation, there are generally still limitations to the size of tree that can be easily transported. Though bare roots, small saplings, and even seeds are appealing for projects where many trees are planted, their survival rate is low. To minimize the amount of maintenance required and maximize the likelihood of survival, it's often recommended to plant a tree with a trunk at least 2-4 inches in diameter. Once the tree has arrived at its planting location, planting a tree requires access to tools, time, muscles and good health. At the very least, a shovel, measuring device, stakes and straps, a hammer, and water are required tools. However, depending on the size of the tree, its container, and the quality of the soil, tree planting could also require wire cutters, a wheel barrow, pruning shears, composted soil or fertilizer, a tree bag, mulch, and a knife. Tree planting also requires some knowledge of basic tree terminology/anatomy such as roots, root collar, and root flare. More information on the process of planting a tree can be found on the Arbor Day Foundation website (https://www.arborday.org/trees/planting/), and through a number of local nonprofit and government organizations.

The process of planting trees is full of barriers to access for residents and organized groups with limited resources, time, or mobility. Unfortunately, tree maintenance can be just as complicated and demanding depending on the location and species of tree planted. Maintaining and pruning trees at a young age can reduce long term maintenance needs. Proper pruning of young trees can benefit tree health and eliminate hazards before they develop, and is much more approachable for volunteers and residents. In some spaces such as forests, fields, and riparian areas, maintenance is a lower priority. However, in tight urban settings, neglecting the maintenance of things like fruit harvest, root growth, overhanging branches, and dedicated watering can create additional costs and hazards that could

endanger people, private property, and the trees themselves. Watering, harvest, and basic pruning are all chores that can be managed through regular upkeep. However, managing root growth, overhanging branches and other pruning of large trees should be handled by a professional arborist.

The concept of planting trees and having planned maintenance to prevent damage to the tree or private property seems fairly straight forward. However, due to the web of responsibility for tree care in the City of Milwaukee, the financial and physical costs of planting and maintaining trees, and the politics of tree planting versus maintenance it is very difficult to successfully coordinate both tree planting and maintenance on public and private property around the city. Trees planted on public property such as city owned vacant lots, public parks, and along city streets have a clear contract for maintenance, however there is not enough capacity or resources to meaningfully maintain those spaces through the City and County of Milwaukee. In addition, there are very few opportunities for nonprofits, community organizations, or local businesses to assist with that maintenance. Often times, maintenance is instead left in the hands of unpaid volunteers without much guidance or incentive, or in some cases neglected entirely. Aside from rare cases, city staff are unable to maintain trees on private property, and there are political limitations to using state or federal funding to maintain trees on property that is privately owned. Further, while it is not uncommon for philanthropic groups to fund tree planting efforts, or free tree distribution programs, it is highly uncommon for tree maintenance to be funded, often limiting the capacity of nonprofits to maintain trees on public or private property.

Collective action through the Branch Out Milwaukee Campaign will allow stakeholders around the city of Milwaukee to develop a full understanding of the cost of maintaining Milwaukee's existing canopy, and coordinate strategies to more effectively cover those costs while working to expand Milwaukee's canopy. The lack of coordination between stakeholders around the city of Milwaukee has fostered inefficiencies and in some cases distinct barriers to tree planting and maintenance. A coordinated effort will foster collaborations and partnerships that can build the capacity of participating organizations to manage the costs and responsibilities of tree maintenance and planting. To build trust in communities around Milwaukee, before planting additional trees, it needs to be clear that we are invested in the sustainability of Milwaukee's canopy and the investment of having trees in our community. To exemplify this commitment, the partners within the Branch Out Milwaukee Campaign should develop strategies that will account for the maintenance of Milwaukee's existing canopy, and programs planting trees throughout Milwaukee should require clear strategies for the long term maintenance of those trees.

Workforce and Volunteers

As the demand for tree care and tree planting increases, it will be critical that there are established roles and opportunities for tree care professionals and volunteers to engage with the growth and maintenance of the City of Milwaukee's canopy. In accordance with the frameworks and goals set out by the Branch Out Milwaukee Campaign, these roles should consider criteria for equitably engaging Milwaukee's communities in the process of growing Milwaukee's canopy, including through employment opportunities, education, and access to proper tree care.

Many tree planting initiatives around the City of Milwaukee and around the world have relied on commitments from volunteers to execute programs for tree planting, maintenance, and community outreach. Volunteer programs are a popular tool for reforesting efforts, because they not only reduce the costs of tree planting and maintenance, but also engage and educate the public, establishing a greater social investment in community and canopy. Community groups and nonprofits in Milwaukee

often rely on volunteers to develop and maintain community spaces such as vacant lots and community orchards throughout the city. With community and volunteer support, many nonprofits have had greater success applying for funding to improve community spaces, and develop programs that benefit community health and wellness. Volunteer efforts have had amazing success removing invasive plants, planting and maintaining native trees and vegetation, and developing community green spaces such as shared gardens, orchards, and parks. However, without funding or backbone support, training, and capacity, it's not uncommon for networks of volunteers to fall apart due to other commitments, changes in residency, or frustration.

There are some situations where volunteers are not equipped to handle tree planting or maintenance. To safely maintain large trees requires significant expertise and training. Tree care professionals such as arborists, landscapers, and maintenance workers must go through extensive training to gain certifications that prepare them to properly plant and maintain trees. Further, tree care professionals often have access to equipment and tools that are not readily accessible to volunteer groups or safe for untrained operators. Though volunteerism reduces the costs of urban forestry initiatives with limited capacity and resources to invest in tree planting and maintenance, long term savings come from best practices and tree planting/maintenance that reduces the threat of damage to the tree or surrounding people and property. In the interest of safety and the sustainability of trees planted, it is a best practice that volunteer groups have some oversight from a trained professional, and can rely on tree care professionals for support, guidance, or assistance to sustainably grow trees.

Today the tree care industry faces two major barriers: a need for workers, and a need for exposure. In the City of Milwaukee, and throughout the State of Wisconsin, the demand placed on expanding and maintaining canopy in the face of major storms and tree die offs caused by the Emerald Ash Borer has and will continue to open living wage employment opportunities. It is not uncommon for tree care companies to have extensive waiting lists for tree maintenance and removals, some companies are even shifting away from tree planting to landscaping because of the volume of work available for canopy maintenance. To meet this growing demand, tree care companies are eagerly looking to hire, sometimes holding out for applicants with training/certifications and previous work experience, and in other cases looking to hire dedicated workers to train on their own.

To ensure that Milwaukee's communities are benefiting equitably from tree planting and maintenance in our city, the strategies laid out by the Branch Out Milwaukee Campaign should consider the accessibility of employment opportunities associated with Milwaukee's canopy. In the City of Milwaukee, marginalized and vulnerable communities are commonly unable to access employment opportunities and community decision making opportunities. There has been a lack of intentionality around addressing barriers that have become structural through years of segregation. Through public engagement and employment opportunities, efforts to expand Milwaukee's canopy can establish connectivity between community and their trees. There are many transferable skills and certifications gained through employment within the tree care industry, providing access to employment opportunities throughout the city and the world. As energy and resources flow into efforts to maintain and expand Milwaukee's canopy, to equitably engage Milwaukee's communities in the benefits and decision making around trees, it must be a priority to have a workforce that is representative of the diversity of our city. Volunteerism is generally not sustainable or a priority in the face of economic or social challenges. Being intentional about equitably promoting employment opportunities and building accessible career pathways into leadership positions within the tree care industry will grant residents

agency to find family supporting wages while also shaping community green spaces and growing Milwaukee's canopy. Further, employees are a bridge to the community, fostering engagement and awareness of messaging about the benefits of trees and best practices for tree care. Rather than relying solely on volunteers, funding and contracts should be written to include compensation for residents who engage in tree care, planting, and community outreach. This should include compensation for the sharing of knowledge and thinking on issues related to funded programs and initiatives.

Despite growing energy and organizing across the city of Milwaukee that is producing investments in green infrastructure, storm water trees, community orchards/gardens, and community green spaces there continues to be barriers to establishing equitable pathways into employment in the tree care industry. A number of programs around the city of Milwaukee offered by nonprofit, and for-profit organizations engage volunteers and employees in local tree care activities and provide training and oversight, sometimes even resulting in certifications. These programs often encounter barriers to financing full time employees because of the seasonality of grant and contract funded tree planting activities. While tree care employers often shift to tree pruning or in class trainings and certifications in the winter, these programs are difficult to fund for smaller organizations working from contract to contract. To remedy this barrier, some programs turn to invasive species removal, in house training, or even filing for unemployment in the off season. Though these programs offer exciting opportunities to advertise the accessibility of positions in tree care or maintenance of community green spaces, they often face a barrier when trying to connect participants to advanced employment opportunities. Without an established pipeline to careers in the tree care industry, community-based programs continue to chase a moving bar for required experience and certifications. Further, with a lack of experience in cultural competency, or diverse hiring, many industries around Milwaukee including the tree care industry struggle to overcome cultural and structural barriers to hiring and retaining employees from marginalized communities. This reality has diminished relationships between employers in the tree care industry and community initiatives that focus on increasing access to employment for marginalized communities.

To bolster interest in the tree care industry and establish clear career pathways into arboriculture, the State of Wisconsin has developed the first arborist apprenticeship in the country, as well as the first pre-apprenticeship program. These state funded workforce development programs establish standards for certifications and training necessary to find employment in the tree care industry, as well as accessible pathways to obtaining those skills and connecting with employers. Wisconsin's Arborist Apprenticeship only requires that you be eighteen years of age with a high school diploma or GED, a driver's license, and a certified employer. However, without Wisconsin's Arborist Pre-Apprenticeship, there are distinct barriers to connecting unexperienced job seekers to employers with the means to train incoming arborists, mostly based on employer capacity and preference. When these programs are paired: employers are subsidized through state funding to support the training of new employees for the first six months of their employment; participants are assisted with costs for transportation, new equipment, and have access to wrap around services such as mentorship and financial literacy training; and participants are paid to gain skills and experience, while assisting with both public and private tree planting and maintenance projects around the city.

Many of the certifications and trainings attached to the arborist career pathway are provided through the Milwaukee Area Technical College (MATC) system. These classes commonly partner with employers like the City and County of Milwaukee to find training areas for tree maintenance and planting that

reduce the burden on each institution's capacity. Though it is possible to form similar partnerships with community partners working in public spaces, there is no existing infrastructure to form those relationships, and since most nonprofit sponsored tree planting projects are one off activities, there is very little incentive to invest in connecting these projects to skills trainings.

Connecting diverse pathways into tree care around the city of Milwaukee will foster community engagement with tree planting and maintenance, and bolster the accessibility of career pathways into the tree care industry. The creation of the Wisconsin Arborist Apprenticeship and Pre-Apprenticeship programs are a huge step for the tree care industry, establishing a clear standard for training and a pathway for entry into living wage employment. To maximize the success of this program, community partners should be engaged with those pathways, utilizing existing programs and networks to create exposure to the tree care industry and increase the visibility of the tools available to pursue careers in tree care. While there are limitations to the ability of state funded programs to engage private property owners or maintain trees on private property, grant and small contract funded programs can employ residents or establish volunteer programs that engage with private property owners through outreach or tree planting/maintenance. Connecting employee trainings to community tree planting efforts has the potential to provide volunteer groups and community groups with the resources necessary for more intensive tree planting and maintenance, while simultaneously exposing them to opportunities to access careers in the tree care industry. Creating more positive connections between tree care industry employers/employees and the communities that they service, utilizing the frameworks of the Branch Out Milwaukee Campaign, will foster trust and build relationships that reshape the culture around trees and tree care in Milwaukee.

The Importance of Collective Thinking

Though many actions taken by the Branch Out Milwaukee Campaign will be organized by individuals and organizations with independent missions and projects, actions taken under the goals and frameworks outlined by the Branch Out Milwaukee Campaign will support collective action. Energy put towards Milwaukee's canopy has the potential to benefit public health, environmental health, economic security, and access to living wage employment. Often, the mission and objectives of organizations and businesses focus on addressing only a subset of the potential of Milwaukee's canopy. In order to maximize the benefits of efforts to plant and maintain trees around the city, it is critical that there is ongoing communication and collective thinking that can be consulted when planning programs and engagement that would impact Milwaukee's canopy.

Often times, the unique expertise, resources, capacity, and programming coordinated by diverse organizations will make them better suited for niche components of collective action programs. Rather than re-creating the wheel, developing connections between organizations with compatible niches will establish partnerships and coexisting programming that can maximize the efficiency and impact of tree planting and maintenance programs. The Branch Out Milwaukee Campaign hopes to impact big and complex systems that are frequently approached as separate, but in reality are intertwined at many levels. This will mean that to meet the goals and frameworks of the Branch Out Milwaukee Campaign, program partners will need to consult and be guided by unconventional allies to develop effective strategies. Connecting to develop shared wisdom and resources will provide partnering organizations with more power to create meaningful change and to overcome barriers they might have experienced independently.

Through the network of the Branch Out Milwaukee Campaign we have an opportunity to avoid repeating history and establish a healthier future for community and canopy in Milwaukee. Sharing perspectives from diverse stakeholders, community leaders, and residents, and developing strategies that account for all of the benefits of trees' will develop socially and environmentally sustainable approaches to growing and maintaining Milwaukee's canopy. By remaining transparent and acting collectively or collaboratively, partners can overcome or organize to advocate for changes to barriers that prevent action towards agreed upon solutions.

Leveraging Policy, Creating Accountability

The network organized through the Branch Out Milwaukee Campaign has the potential to be a powerful advocate for changes to policies that limit actions effecting Milwaukee's canopy. The voice of the Branch Out Milwaukee campaign holds diverse perspectives and approaches to understanding Milwaukee's canopy and how it relates to public and environmental health. By leveraging the support of this network, and the communities that they represent, there is significant potential to change policies that limit action towards reaching the goals and frameworks of the Branch Out Milwaukee Campaign.

There are barriers to maintaining Milwaukee's canopy in the best interest of Milwaukee's communities based in policy, historical decisions, and communication between sectors. Policies that prevent the sharing of capacity, that limit equitable approaches to coordinating tree maintenance around the city, or reduce the funding for departments that manage public resources, are a detriment to actions that support and foster healthy communities. Historical decisions that have resulted in inequitable access to a healthy environment, such as decisions to develop impermeable pavement rather than green spaces or to plant near-monoculture canopy, have had a disproportionate impact on vulnerable communities bearing the brunt of environmental injustice and climate change. A lack of communication and coordination between sectors, has allowed these barriers and decisions to take shape and dictate the way that we approach the intersections of environmental and public health.

We will need to be transparent about our history and the barriers that prevent action to collectively overcome obstacles to progress. The scope of the Branch Out Milwaukee Campaign considers the distribution of Milwaukee's canopy an environmental justice issue that is inequitably threatening public health. Today, communities around Milwaukee are struggling to remain resilient in the face of climate change, and rather than benefiting from the economic potential of reforesting Milwaukee's canopy are trying to find ways to manage the costs of a historically under-maintained canopy. To rebuild trust in Milwaukee's communities and move forward together, we need to be transparent about the history of Milwaukee's canopy and hold ourselves accountable to our complacency in maintaining the systems and barriers that burden Milwaukee's communities. Being honest about the barriers that we all face, and transparent about the work that we are and are not able to do, will empower communities and stakeholders from around the city to take action as advocates for change.

The diversity of stakeholders that are engaged with the Branch Out Milwaukee Campaign establish a flexible platform for overcoming the barriers that limit action in independent sectors. Barriers that exist for a subset of stakeholders of the Branch Out Milwaukee Campaign might not limit others. Taking action collectively will empower work happening throughout Milwaukee to meet the needs and vision of community leadership. By remaining transparent while engaging communities, we can establish a better understanding of community narratives around Milwaukee's canopy and develop shared strategies to address barriers that have created burdens for Milwaukee's residents. Though there may be daunting

problems that require systems change, capacity, or major funding, there will be more agency to organize and create change among collective actors than as independent sectors or organizations.

Funding Strategies

Coordinating a multifaceted approach to maximize the benefits of Milwaukee's canopy provides the Branch Out Milwaukee Campaign with some flexibility to leverage a variety of unique funding opportunities. Throughout the Midwest, Wisconsin, and Milwaukee County, there are a number of funding opportunities specific to tree planting and green spaces that could be leveraged through government and philanthropic organizations. However, in addition to those opportunities, focusing the efforts of the Branch Out Milwaukee Campaign on community health and wellness makes the program and the work of its partners eligible for diverse funding sources connected to climate resiliency, community health, workforce development, and environmental justice. In this section we will review how organizing collectively will facilitate more effective and efficient spending connected to Milwaukee's canopy, and suggest how funding might operate through the Branch Out Milwaukee Campaign.

The Branch Out Milwaukee Campaign is an ambitious approach to reshaping how stakeholders around the City of Milwaukee approach urban forestry. Coordinating the maintenance and growth of Milwaukee's canopy will require a greater investment in Milwaukee's forestry initiatives, and doing so to also address social equity, community health, environmental justice, and climate resiliency will require significant commitments from project partners and flexibility.

One advantage of organizing collectively through this program is that communication and coordination through the Branch Out Milwaukee Campaign will mean more effective and efficient spending to address individual and collective priorities. One of the largest undertakings of the Branch Out Milwaukee Campaign will be to successfully organize strategies that play off of the strengths and compatibility of diverse stakeholders. Rather than attacking projects en masse, it is a goal of the Branch Out Milwaukee Campaign that program partners acting in niche roles will share resources, capacity, and thinking when organizing tree care initiatives. To actualize this vision, project partners will need to be transparent about their barriers and restrictions, and open to new innovative and collaborative approaches to meeting mutually reinforcing goals or metrics. Many of the partners engaged with the Branch Out Milwaukee Campaign are already coordinating and funding exciting programs that focus on community and canopy in Milwaukee. Connecting these programs, sharing ideas and approaches, and supporting the potential of parallel programs to benefit shared goals for community and canopy health will increase the impact of individual programs and illuminate best practices. In some cases; this will mean altering programs to consider the many relationships between community and canopy, in other situations it might mean finding ways to share the capacity of overwhelming programs or problems. These collective approaches should be navigated considering the frameworks and goals of the Branch Out Milwaukee Campaign, and organized with insight from the Branch Out network and Milwaukee's communities.

Research conducted through the Branch Out Milwaukee Campaign has found that there is currently not enough funding to maintain or grow Milwaukee's canopy, and that current spending does not equitably benefit communities around the City. Connecting independent stakeholders and sectors that influence community and canopy health around Milwaukee has the potential to create efficiencies that can more equitably and effectively distribute funding to plant and maintain trees in around the city. However, in order to have a major impact on community and canopy health, environmental justice issues, and

climate resiliency stakeholders engaged with the Branch Out Milwaukee Campaign will need to organize to leverage increased funding that supports mutually reinforcing programs. The multifaceted scope of the Branch Out Milwaukee Campaign makes it eligible to apply for funding from a variety of sources through engagement with diverse stakeholders. The network established by the Branch Out Milwaukee Campaign draws from many sectors, engaging federal, state, and local government, community and nonprofit groups, and businesses, all committed to supporting solutions for addressing community and environmental health needs. Funding entering this network will bolster the strength and impact of programs around Milwaukee, sometimes through collaborative projects, and often through shared support and coordination. Working through partners with significant experience and expertise or access to specific elements of tree care such as tree planting and maintenance on private or public property will improve the reach of the network and its programs. Partners such as city or state government agencies with the means to fund or support major funding applications can help partners with less capacity to navigate large scale projects and address barriers that are financially unapproachable independently. Navigating these and other approaches could be prioritized by considering the frameworks of the Branch Out Milwaukee Campaign, and by drawing input from stakeholders and communities around the City of Milwaukee.

Ten Year Time Table

Moving forward with a shared agenda, the Branch Out Milwaukee Campaign will engage collectively to act on short and long term goals aimed at changing systems, resolving environmental injustices, and addressing both immediate and felt needs related to Milwaukee's canopy. In this section, we will attempt to frame suggested actions to establish a ten year vision for the Branch Out Milwaukee Campaign.

In order to open a discussion about the ten year vision of the Branch Out Milwaukee Campaign, project partners were asked to reflect on their one year, two to four year, and five to ten year goals for both collective action and individual stakeholder actions. The results were a broad diversity of responses related to community and canopy. Some stakeholders cited specific programs or tree planting goals held by their organizations. Others listed goals for community engagement and education, or even education of employees within partnering organizations about the value of trees. Still other goals were related distinctly to workforce development, community health, or other environmental health. Many of the goals set out by each stakeholder were based on unique strategies and organizational approaches, sometimes in the interest of distinct programs, and other times with the intention of developing new connections with partners and communities around Milwaukee.

Stakeholder goals for the Branch Out Milwaukee Campaign could be synthesized more generally based on their associated time scale. When asked to provide one year goals for the Branch Out Milwaukee Campaign, stakeholders listed action items: shared approaches that could boost the visibility of the Branch Out Milwaukee Campaign and allow stakeholders to invest in actions that would impact Milwaukee's community and canopy. Stakeholders' two to four year goals were more consistent with the vision of shared approaches to fostering equitable access to the many benefits of trees and tree planting/maintenance programs. In the scope of five to ten years, partners hoped to see systems change, heat islands addressed, improved air quality, canopy goals met, invasive species controlled, equitable distribution of trees and green spaces, and paid pathways into the tree care industry.

To embody equity in our approach to taking action on environmental justice crises and the needs of Milwaukee's communities and canopy will require systems change that reshapes the status quo. One of the assets of the Branch Out Milwaukee Campaign is the capacity to organize the efforts of communities and stakeholders around the City of Milwaukee interested in best practices for tree planting and maintenance. By aligning resources, knowledge, and perspectives, and acting collectively we have the potential to take efficient and effective action that will maximize the community and environmental benefits of Milwaukee's canopy. Taking action in this way will allow the Branch Out Milwaukee Campaign to address environmental justice crises around the city of Milwaukee such as urban heat islands, food deserts, neighborhood flooding, poor air quality, or unemployment. In order to ensure that this impact is equitable and sustainable, it's important that the actions of the Branch Out Milwaukee Campaign also work to change systems that have created and enabled the status quo and do so while engaging strategies reflective of community narratives about Milwaukee's canopy. Beyond taking action on the immediate need to address environmental crises in Milwaukee, the ten-year platform of the Branch Out Milwaukee Campaign will consider how developing shared frameworks for action and diverse networks of stakeholders can leverage change to establish equity, community health, and environmental health as norms in the City of Milwaukee. To reshape the culture around Milwaukee's canopy, actions taken through the Branch Out Milwaukee Campaign will be shaped by community narratives of the relationship between Milwaukee's residents and canopy. Approaching these three metrics for action will require setting both short term and long-term goals as well as strategic plans for impact. While there may be short term goals that can be acted on immediately by stakeholders around the table, there will be many goals that require intensive planning and coordination, sometimes with partners and community organizers currently outside of the Branch Out Milwaukee Campaign network. Further, some of the strategies established by partners and stakeholders will be framed around dynamic environmental and social systems. To establish long term goals that account for the perspectives of future generations, it will be best practice to form adaptive processes for decision making that can navigate changes to stakeholders, communities, and the environment.

To be successful taking action, projects pursued by this campaign will need to align with a shared agenda, guided by collectively shared frameworks and goals. To meet the goals and frameworks set out by the Branch Out Milwaukee Campaign, the timeline for action will need to consider both community and stakeholder goals for Milwaukee's canopy. A next step for the Branch Out Milwaukee Campaign could be to develop shared measurements and mutually reinforcing actions.

When establishing an action plan for the Branch Out Milwaukee Campaign, partners will need to focus on facilitating community engagement, engaging with a broader coalition of community leaders and residents to solicit guidance on approaches and best practices. To take action on a shared agenda, a next step for the Branch Out Milwaukee Campaign will be to engage with communities around the City of Milwaukee to learn from community narratives about trees, and develop relationships that establish support for a community defined vision of how to maximize the benefits of Milwaukee's canopy. Many partners engaged with the Branch Out Milwaukee Campaign are connected to existing networks and coalitions of community leaders in Milwaukee. Leveraging these relationships to communicate the knowledge, capacity, and mission of the Branch Out Milwaukee Campaign to community leaders around the city will help establish new relationships as well as priority steps for developing mutually reinforcing initiatives that can be undertaken collectively.

Establishing shared measurements between stakeholders will support shared actions, create transparency, and further develop the platform being communicated to community leaders around the City of Milwaukee. To better understand each stakeholder's measurements of success, and shared measurements for the actions of the network, stakeholders engaged with the Branch Out Milwaukee Campaign could coordinate an assessment of programs impacting Milwaukee's canopy community relationships. Having a broader dialogue about existing programs and where they intersect would grant community residents and stakeholders more transparency to understand the relationship between these programs and where collective action could overcome the limitations of each individual's capacity. To mobilize mutually reinforcing activities and foster systems change, there will need to be shared dialogue between stakeholders about how to pursue the goals and frameworks of the Branch Out Milwaukee Campaign. Maintaining this dialogue and engaging impacted communities around the city in the design of shared actions will ensure that stakeholders are meeting the frameworks and goals outlined in this report. To ensure that the actions and metrics being designed through this process are both socially and environmentally sustainable, this process will be revisited and remain adaptive. Stakeholders and residents consulted regularly to critically review collective and individual approaches to meeting the shared goals and metrics of the Branch Out Milwaukee Campaign can study, discuss, and improve those approaches. Consistently reviewing actions undertaken by the network will ensure that the Branch Out Milwaukee Campaign's approach is adapting to changing systems and continues to foster environmental justice and community and environmental health benefits beyond the next ten years.

Conclusion

The planning, intention, and energy that have produced this report position Milwaukee to truly impact a looming community and environmental health crisis. Connecting stakeholders from diverse sectors around Milwaukee to discuss the future of the city's canopy has created dialogue that previously did not exist. By sharing perspectives and reflecting on the history of canopy maintenance in the City of Milwaukee, the Branch Out Milwaukee Campaign has established a unique understanding of the relationship between community and canopy. The stakeholders involved with this initiative have an opportunity to engage each other and with communities around the City to reach shared objectives with mutual benefits, and to establish the foundation for a socially and environmentally sustainable future for the city and its canopy.

There is a distinct relationship between Milwaukee's history of racial segregation and economic inequality with the environmental injustice that we see manifesting today with Milwaukee's canopy and climate change resiliency. Addressing many of the barriers that have fostered these environmental injustices will also provide opportunities to be intentional about addressing the role that hyper segregation continues to play in our city. For our city to overcome these systems that have been intentionally built into our history, we must be intentional about eliminating them. By building the Branch Out Milwaukee Campaign to center equity, respect, and environmental justice, the energy of this work can have sustained impacts to this end.

To achieve the goals and frameworks laid out in this report, there will need to be maintained communication, planning and action engaging stakeholders and residents around the City of Milwaukee.

Milwaukee Water Commons is excited to continue working towards this end, and is thankful for the support of an incredible group of partners and communities around the City of Milwaukee.

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Citations

916 F.2d 1261- United Association of Black Landscapers v. City of Milwaukee (United States Court of Appeals, Seventh Circuit October 29, 1990).

Bell, T. J. (2019). 2019 PROPOSED PLAN AND EXECUTIVE BUDGET SUMMARY CITY OF MILWAUKEE.

Bell, T. J., Carter, J. Q., Christianson, B., & Ivy, C. E. (2018). 2018 PLAN AND BUDGET SUMMARY CITY OF MILWAUKEE.

Bence, Susan. "Milwaukee Magazine Explores Problems Plaguing Milwaukee County Parks – Maintenance & Money." WUWM Milwaukee's NPR, Milwaukee Public Radio, 21 July 2017, www.wuwm.com/post/milwaukee-magazine-explores-problems-plaguing-milwaukee-county-parks-maintenance-money#stream/0.

Boyle, J. (2009). Concentrated Poverty in Milwaukee. *Profitwise News and Views*, (July), 1–9.

Carmichael, Christine E., & McDonough, M. H. (2018). Community Stories: Explaining Resistance to Street Tree-Planting Programs in Detroit, Michigan, USA. *Society and Natural Resources*, *0*(0), 1–18. https://doi.org/10.1080/08941920.2018.1550229

Carmichael, Christine Elisabeth. (2017). The trouble with trees? Social and political dynamics of greening efforts in Detroit, Michigan. *ProQuest Dissertations and Theses*, 204. Retrieved from http://sfx.scholarsportal.info/guelph/docview/1883375462?accountid=11233%250Ahttp://sfx.scholarsportal.info/guelph?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&genre=dissertations+%2526+theses&sid=ProQ:ProQuest+Dissertations+%2526+The

Chalfont, G., & Rodiek, S. (2005). Building edge: an ecological aproach to research and design of environments. *Alzheimers Care Quarterly*, *6*(4), 341–348.

City of Milwaukee. (2013). Vacant Lot Handbook, 1–35.

City of Milwaukee. 2018. Master Property File.

Coley, R. L., Kuo, F. E., & Sullivan, W. C. (1997). Where does community grow? The social context created by nature in urban public housing. *Environment and Behavior*, *29*(4), 468–494. https://doi.org/10.1177/001391659702900402

Cornelius, Tamarine. "Wisconsin Budget: The Black-White Unemployment Gap." Urban Milwaukee, Urban Milwaukee, 29 May 2018, urbanmilwaukee.com/2018/03/29/wisconsin-budget-the-black-white-unemployment-gap/.

Cutts, B. B., Greenlee, A. J., Prochaska, N. K., Chantrill, C. V., Contractor, A. B., Wilhoit, J. M., … Hornik, K. (2018). Is a clean river fun for all? Recognizing social vulnerability in watershed planning. *PLoS ONE*, *13*(5), 1–21. https://doi.org/10.1371/journal.pone.0196416

Dang, T. N., Van, D. Q., Kusaka, H., Seposo, X. T., & Honda, Y. (2017). Green Space and Deaths Attributable to the Urban Heat Island Effect in Ho Chi Minh City. *American Journal of Public Health*, *108*, e1–e7. https://doi.org/10.2105/ajph.2017.304123

Dennis, Samuel. "Public Health and the Green Environment: Translating Research into Action". Good Health Grows on Trees: The Influence of Nearby Nature on Public Health, 30 May 2019, Janesville WI, Rotary Botanical Gardens.

Donovan, G. H., Michael, Y. L., Butry, D. T., Sullivan, A. D., & Chase, J. M. (2011). Urban trees and the risk of poor birth outcomes. *Health and Place*, *17*(1), 390–393. https://doi.org/10.1016/j.healthplace.2010.11.004

Donovan, G. H., Michael, Y. L., Gatziolis, D., Prestemon, J. P., & Whitsel, E. A. (2015). Is tree loss associated with cardiovascular-disease risk in the Women's Health Initiative? A natural experiment. *Health and Place*, *36*, 1–7. https://doi.org/10.1016/j.healthplace.2015.08.007

Driscoll, A. N., & Riles, P. D. (2015). Cultivating a Greener Collective Impact: A Guidebook for Regional Urban Forestry Collaboration. *Oregon Department of Forestry*, 1–16.

Driscoll, Z., Nenn, C., & Rogers, J. (2018). 2017 Milwaukee River Basin Report Card.

WI Department of Workforce Development. 2018. Wisconsin Long Term Occupation Employment Projections, 2016-2026 (Statewide). Office of Economic Advisors, WI Department of Workforce Development.

Gobster, P. H., & Westphal, L. M. (2004). The human dimensions of urban greenways: Planning for recreation and related experiences. *Landscape and Urban Planning*, *68*(2–3), 147–165. https://doi.org/10.1016/S0169-2046(03)00162-2

Grant, R. H., Heisler, G. M., & Gao, W. (2004). Estimation of Pedestrian Level UV Exposure Under Trees¶. *Photochemistry and Photobiology*, *75*(4), 369. https://doi.org/10.1562/0031-8655(2002)075<0369:eoplue>2.0.co;2

Groundwork Milwaukee. (2019). Milwaukee County Orchard Map, https://gwmke.maps.arcgis.com/apps/webappviewer/index.html?id=47f369c379434c7199bb29b8b4582adb

Hall, K., Ariens, M., & Bradley, A. (2016). Milwaukee Water Commons Water City Agenda 2016.

Henyen, N., Perkins, H. A., & Roy, P. (2007). "Failing to grow "Their" Own Justice? The Co-Production of Racial/Gendered Labor and Milwaukee's Urban Forest. *Urban Geography*, *28*(8), 732–754. https://doi.org/10.2747/0272-3638.28.

Heynen, N., Perkins, H. A., & Roy, P. (2006). The Political Ecology of Uneven Urban Green Space. *Urban Affairs Review*, *42*(1), 3–25. https://doi.org/10.1177/1078087406290729

Hornik, K., Cutts, B., & Greenlee, A. (2016). Community theories of change: Linking environmental justice to sustainability through stakeholder perceptions in Milwaukee (WI, USA). *International Journal of Environmental Research and Public Health*, *13*(10). https://doi.org/10.3390/ijerph13100979

Hystad, P., Davies, H. W., Frank, L., Loon, J. Van, Gehring, U., Tamburic, L., & Brauer, M. (2014). Residential Greenness and Birth Outcomes: Evaluating the Influence of Spatially Correlated Built-Environment Factors. *Environmental Health Perspectives*, *122*(10), 1095–1102. https://doi.org/10.1289/ehp.1308049

i-Tree. (2014). i-Tree Ecosystem Analysis: Milwaukee, *5*(November).

Jesdale, B. M., Morello-Frosch, R., & Cushing, L. (2013). The racial/ ethnic distribution of heat risk-related land cover in relation to residential segregation. *Environmental Health Perspectives*, *121*(7), 811–817. https://doi.org/10.1289/ehp.1205919

Kardan, O., Gozdyra, P., Misic, B., Moola, F., Palmer, L. J., Paus, T., & Berman, M. G. (2015).

Neighborhood greenspace and health in a large urban center. *Scientific Reports*, *5*(July). https://doi.org/10.1038/srep11610

Lanza, K., & Stone, B. (2016). Climate adaptation in cities: What trees are suitable for urban heat management? *Landscape and Urban Planning*, *153*, 74–82. https://doi.org/10.1016/j.landurbplan.2015.12.002

Largo-Wight, E., Chen, W. W., Dodd, V., & Weiler, R. (2017). Healthy Workplaces: The Effects of Nature Contact at Work on Employee Stress and Health. *Public Health Reports*, *126*(1_suppl), 124–130. https://doi.org/10.1177/00333549111260s116

Levine, M., Madison, C., Lee, S., Shah, P., Williams, L. H., Taylor, C., & Velez, W. (2016). Latino Milwaukee Study 2016.

Levine, M. V. (2019). Milwaukee 53206: The Anatomy of Concentrated Disadvantage In an Inner City Neighborhood 2000-2017, (March).

Lovasi, G. S., Quinn, J. W., Neckerman, K. M., Perzanowski, M. S., & Rundle, A. (2008). Children living in areas with more street trees have lower prevalence of asthma. *Journal of Epidemiology and Community Health*, *62*(7), 647–649. https://doi.org/10.1136/jech.2007.071894

Mooney, P., & Nicell, P. L. (1992). The Importance of Exterior Environment for Alzheimer Residents: Effective Care and Risk Management. *Healthcare Management Forum*, *5*(2), 23–29. https://doi.org/10.1016/S0840-4704(10)61202-1

Nesbitt, L., Meitner, M. J., Girling, C., Sheppard, S. R. J., & Lu, Y. (2019). Who has access to urban vegetation? A spatial analysis of distributional green equity in 10 US cities. *Landscape and Urban Planning*, *181*(June 2018), 51–79. https://doi.org/10.1016/j.landurbplan.2018.08.007

Nowak, D. J., Crane, D. E., & Stevens, J. C. (2006). Air pollution removal by urban trees and shrubs in the United States. *Urban Forestry and Urban Greening*, *4*(3–4), 115–123. https://doi.org/10.1016/j.ufug.2006.01.007

Nowak, D. J., Greenfield, E. J., Hoehn, R. E., & Lapoint, E. (2013). Carbon storage and sequestration by trees in urban and community areas of the United States. *Environmental Pollution*, *178*, 229–236. https://doi.org/10.1016/j.envpol.2013.03.019

Ordonez, C., Duinker, P. ., & Steenberg, J. (2010). Climate Change Mitigation and Adaptation in Urban Forests : A Framework for Sustainable. *18th Commonwealth Forestry Conference*.

Pawasarat, J., & Quinn, L. M. (2014). Wisconsin' s Mass Incarceration of African American Males, Summary. *ETI Publications*, (10).

Perkins, H. A., Heynen, N., & Wilson, J. (2004). Inequitable access to urban reforestation: The impact of urban political economy on housing tenure and urban forests. *Cities*, *21*(4), 291–299. https://doi.org/10.1016/j.cities.2004.04.002

Pretty, J., Peacock, J., Sellens, M., & Griffin, M. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, *15*(5), 319–337. https://doi.org/10.1080/09603120500155963

Robinson, S., Nicolini, M., Bell, T. J., Carter, J. Q., Ivy, C. E., Lofton, M., … Yaccarino, D. (2017). 2017 PROPOSED PLAN AND EXECUTIVE BUDGET SUMMARY CITY OF MILWAUKEE STATE OF WISCONSIN.

Rook, Brandon. "Fighting Food Deserts and Hunger in Milwaukee." TMJ4, WTMJ-TV Milwaukee, 21 Aug. 2018, www.tmj4.com/news/local-news/fighting-food-deserts-and-hunger-in-milwaukee.

Sivyer, D., Brown, I., Hanou, I. S., Thurau, R., Peiffer, C., Wood, T., & Hauer, R. (2016). The True Cost of Urban Forest Pathogens: A Cost/Benefit Analysis of Dutch Elm Disease, Emerald Ash Borer And Historical Tree Canopy in Milwaukee, Wisconsin The Costs of Not Maintaining Trees View project, (November 2015). Retrieved from https://www.researchgate.net/publication/305681446

Smeeding, T. M., & Thornton, K. (2018). Poverty, Incomes, Race and Ethnicity in Wisconsin and Milwaukee: a Supplement To the 2016 Wisconsin Poverty Report, (September). Retrieved from https://www.census.gov/topics/income-

Spahr, C., Gill Fellow, N., & Henken, R. (2016). An Apple A Day: How Obesity Impacts Milwaukee and an Analysis of Prevention Strategies from Other Cities. *Public Policy Forum*.

Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2001). Coping with ADD. The surprising connection to green play settings. *Environment and Behavior*, *33*(1), 54–77. https://doi.org/10.1177/00139160121972864

Thostenson, K., Witzling, L., Shaw, B., & Knoot, T. G. (2019). Communicating More Effectively about Urban Forestry.

Troy, A., & Davis, S. (2016). Urban Forest Connections Webinar Series: How Urban Tree Canopy Regulates Micro Climate and Urban Heat Islands: A Study from Denver and Baltimore. *USDA*, 0–2.

U.S. Environmental Protection Agency. (2008). Reducing Urban Heat Islands Compendium of Strategies Trees and Vegetation. *Us Epa*, 1–22. Retrieved from http://www.epa.gov/heatisland/about/index.htm%5Cnpapers2://publication/uuid/E82A9E0C-E51A-400D-A7EE-877DF661C830

Ulmer, J. M., Wolf, K. L., Backman, D. R., Tretheway, R. L., Blain, C. J., O'Neil-Dunne, J. P., & Frank, L. D. (2016). Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription. *Health and Place*, *42*, 54–62. https://doi.org/10.1016/j.healthplace.2016.08.011

United States Environmental Protection Agency. (2013). Stormwater to Street Trees: Engineering Urban Forests for Stormwater Management, 35.

Watkins, S. L., & Gerrish, E. (2018). The relationship between urban forests and race: A meta-analysis. *Journal of Environmental Management*, *209*(December), 152–168. https://doi.org/10.1016/j.jenvman.2017.12.021

Wisconsin Department of Health Services. (2018). Annual Wisconsin Death Report: 2016, 1–21.

Wisconsin Department of Natural Resources. *Wisconsin Community Tree Map*. WDNR, 2018, pg-cloud.com/Wisconsin/.

"Urban Forestry Assessment (WisUFA) Program. Wisconsin Community Canopy Cover." Wisconsin Community Canopy Coverage, Wisconsin Department of Natural Resources, 7 June 2019, dnr.wi.gov/topic/urbanForests/ufia/landCover.html.

Wolf, K. L. (2005). Business District Streetscapes, Trees, and Consumer Response. *Journal of Forestry*, *103*(8), 396–400.

Wolf, K. L. (2016). The Health and Financial Benefits of Nearby Nature. *Nature´s Riches*, 6. Retrieved

from
https://www.naturewithin.info/New/2016.11.Economic_Benefits_of_Nature_in_Cities.KWolf.pdf