



Uncovering the Role and Labor of Volunteer Leaders within a Community-Led Urban Tree Planting Initiative

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ABSTRACT

Urban forestry programs across North America rely on volunteers to lead urban forest stewardship activities and encourage participation in tree planting and general maintenance. We examined the leadership structure of a tree planting initiative (TPI) in the greater Philadelphia region to understand the role and labor contributions of volunteer leaders, and the current challenges of achieving equitable urban tree canopy within community-led TPIs. Using an online survey, we found that leaders contribute unpaid labor, time, and skills within the following categories: group organization and communication, tree-planting and event coordination, tree care and maintenance, and broader environmental education and advocacy. Volunteer leaders also face challenges related to leadership and administrative tasks. This study deepens understandings of the labor needs within volunteer TPIs and potential ways to support the equitable growth of these initiatives moving forward. Future research is needed to understand recognitional equity gaps in volunteer leadership more broadly.

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Introduction

Volunteer labor is a large component of environmental stewardship (Fisher, Svendsen, and Connolly 2015), and is essential within complex local networks of urban green infrastructure governance (Connolly et al. 2013; Jerome, Mell, and Shaw 2017; Mattijssen et al. 2018). Urban forestry programs in particular have utilized volunteers to aid in stewardship activities, including tree planting, general maintenance such as pruning and watering, and data collection (Elton et al. 2022; Hauer et al. 2018; Roman et al. 2018). Many cities in the United States (US) have turned to tree-planting initiatives (TPIs) as means of increasing urban tree canopy cover and producing ecosystem services, including large-scale tree planting campaigns as well as numerous ongoing tree planting and distribution programs (Campbell 2017; Nguyen et al. 2017; Pincetl et al. 2013). A survey of 41 TPIs in the US conducted by Eisenman et al. (2021) found that

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TPIs regularly engage a variety of public and private actors to help achieve ambitious urban tree canopy goals. Many of these actors are unpaid residents and volunteers, suggesting the growing popularity of TPIs requires a closer look at the role of these unpaid actors, particularly community leaders, and how their labor contributes to the overall growth and maintenance of the urban forest.

Prior scholarship on volunteerism in urban forestry has focused on understanding common motivations behind stewardship engagement and who commonly volunteers (Elton et al. 2022; Fisher et al. 2011; Johnson et al. 2018; Moskell, Allred, and Ferenz 2010), as well as the role volunteers can play in carrying out maintenance and thereby promoting tree survival (Boyce 2010; Roman et al. 2015) and opportunities to better support these volunteer-based initiatives (Harper et al. 2018). Volunteers' motivations to serve as stewards of their local environment relate to existing personal and organizational ties, desires for social connection, deep emotional attachment to neighborhoods, and a desire for a more esthetically pleasing urban environment (Conway 2016; Fisher, Svendsen, and Connolly 2015; Foster 2021; McDougale, Greenspan, and Handy 2011). Volunteers report many benefits from their work, such as building social ties and relationships, and contributing critical economic value and stewardship networks in urban greening overall (Elton et al. 2022).

Cities are committing to TPIs and expanding urban tree canopies putting increased pressure on volunteer labor. Studies seeking to quantify this demand have demonstrate the value of volunteer labor to TPIs. Daniels et al. (2014) demonstrate that on-site volunteer labor contributes an estimated \$78 per event. Hauer et al. (2018) estimates volunteers contribute 1.48 million hours to TBIs annually, roughly equivalent to 700 full-time municipal staff. However, less is known regarding of the labor commitment and responsibilities of community members who choose to become leaders of greening initiatives, including what this labor entails in terms of tasks, skills required, and hourly contributions. Many TPIs work closely with community stakeholders to create connections on the neighborhood scale and promote initiatives. These leaders take responsibilities that extend beyond the day of planting, helping to organize and coordinate a group of volunteers to successfully prepare, lead and maintain TPIs (Breger et al. 2019; Eisenman et al. 2021).

As volunteer leaders become integral to the success of urban greening governance policies and community partner programing, scholars have begun to question the potential environmental justice impacts of an increased government reliance on volunteerism for upkeep and installation of public services and urban green infrastructure, such as trees (Campbell 2017; Rosol 2012). For example, in disadvantaged neighborhoods that face community concerns, such as gun violence, residential displacement, and food insecurity, community leaders may not have the time and capacity to invest in tree planting and care, despite the value these individuals place on trees and green space (Riedman et al. 2022). Existing programs that incorporate resident requests for new trees and volunteer tree planting struggle with higher participation in areas with higher percentage of existing tree canopy (Locke and Grove 2016), as well as volunteers who are non-representative of the broader urban population (Elton et al. 2022; Martinez and McMullin 2004). These differences in neighborhood engagement, combined with the increased demand for community-based leadership, may amplify well-documented distributional equity concerns within the urban forest among both race and class lines

(Foster, Dunham, and Bukowska 2022; Gerrish and Watkins 2018; Heynen, Perkins, and Roy 2006; Schwarz et al. 2015). To help prioritize the needs of historically marginalized communities, there is a need to understand the nature of volunteer leadership requiring an expanded focus on multiple dimensions of environment justice (i.e. procedural and recognition; adapted from Schlosberg 2007) beyond distributional analysis.

In this study, we deepen our understanding of the role volunteer labor within community-led urban greening initiatives through an in-depth look at the contributions and needs of leaders within a TPI in Philadelphia, PA. Our study goals were to (1) analyze volunteer group structure, including funding and organizational ties, (2) evaluate leadership structure, such as who is paid and volunteer, and (3) estimate labor contributions and activities contributed by leaders. We then analyze these aspects of community leadership to provide context regarding the role of volunteer labor and current challenges facing the growing trend of community-led TPIs more widely.

Methods

Approach

We took a transdisciplinary approach, bringing together urban forestry leaders at the nonprofit organization Philadelphia Horticultural Society (PHS) and researchers at Temple University and the US Forest Service. Our focus was to engage community leaders within a volunteer TPI, the Tree Tenders (TT) program. This program operates in the greater Philadelphia region and involves volunteer residents who sign up to complete a training and lead neighborhood groups to help plant and care for trees in their surrounding community. Using an online survey instrument, we aimed to understand the labor demands placed on tree planting leaders within urban forestry efforts in the greater Philadelphia area.

Study System

This paper focuses on the case study of the Tree Tenders (TT) program, a resident-led tree planting and stewardship program coordinated by PHS. Founded in 1993, the program offers tree-care training workshops for residents of Philadelphia and expanded in 2005 to serve the adjacent suburban counties in southeastern Pennsylvania. Philadelphia is a minority-majority post-industrial city with a population of over 1.6 million and a 22.8% poverty rate (U.S. Census Bureau 2020). In comparison, the adjacent, majority-white Philadelphia suburbs (Bucks, Chester, Delaware, and Montgomery Counties) have a total population of 2.6 million and a poverty rate below 11% (U.S. Census Bureau 2020), although there is substantial socioeconomic variation across the suburbs. Philadelphia Parks and Recreation (PPR) historically struggled with underfunding and staffing cuts (Roman et al. 2021), currently spending \$25 less per resident than the national average (Trust for Public Land 2022). This is tied to a history of municipal disinvestment in Philadelphia where the city parks budget has been drastically reduced over several decades, losing 66% of employees from 1970–2000 (Roman et al. 2021). The urban forests of suburban municipalities are managed through a mix of Shade Tree Commissions (an appointed body of local residents to oversee

planting and maintenance of the tree canopy, generally reliant on volunteers, Elmendorf et al. 2003), municipal departments (e.g., Parks, Public Works), and/or local civic groups.

The TT program offers training workshops, where participants become ‘Tree Tenders’ after completing eight to nine hours of basic training to learn about tree planting and care, as well as community organizing strategies. After graduating, individuals can then either join an existing TT group in their neighborhood or start a new group with a minimum of three members. Groups work semi-autonomously in their own communities to promote and plan tree-planting events twice per year. While the program is currently led by a small staff of five PHS employees, each TT group is entirely organized by volunteer community leader/s. Together, these TT group recruit new participants, organize planting days, and promote post-planting tree care and monitoring. TT groups are also encouraged to participate in Tree Checkers, a civic science program launched by PHS in 2011 to collect data on recently planted trees, including tree growth, crown vigor and rates of survival (Roman et al. 2018). Currently, over 4,000 trees get planted each year in the Philadelphia region. Trees are provided for free within the City of Philadelphia, but at a subsidized cost of \$60 for the first 30 trees in the suburbs.

Data Collection and Analysis

To better understand the labor contributions of volunteer TT group leaders, specifically the time, skills and activities supporting TPIs, an online survey was sent to all current TT leaders in both the City of Philadelphia and suburbs during the summer of 2021. Questions included themes such as group organization and motivations, access to funding, planting activities and locations, leadership structure and labor contributions (see [supplementary materials](#) for survey instrument). Some survey questions were adapted from the USDA Forest Service stewardship mapping and assessment tool (Svendsen et al. 2016). After receiving feedback from program stakeholders and other experts in community forestry, a pilot survey was sent to former leaders to determine coherency.

To ensure that we only selected leaders who were currently active in the program, participants were asked if they were the current leader of a TT group, and if their group had planted or applied to plant a tree in the last five years. Participants who answered ‘yes’ to both questions were prompted to complete the survey. Out of 110 TT leaders invited, a total of 71 participants responded to the survey with partial or complete responses. Out of 71 responses, 50 people completed the entire survey. Both incomplete and complete responses were included in data analysis.

Survey responses were summarized using descriptive statistics and organized according to general themes related to (1) group structure, (2) leadership structure, and (3) labor contributed by leaders. Open text questions were analyzed qualitatively using an inductive coding method (Bernard and Ryan 2010). Coauthors met and discussed preliminary results to arrive at a consensus. Initial findings were also shared in an internal report and presentation to PHS stakeholders and TT leaders.

Results

TT leaders were represented from all over the Philadelphia region and split between the City of Philadelphia (51%), and the surrounding counties (49%). Most respondents

reported to be white (73%), female (61%) and/or over 60 years old (51%) (See Table 1). 79% are long-time residents, living in their neighborhoods over 11 years, while 57% have resided in the same neighborhood for 21 plus years. A majority (58%) of respondents reported they earn an average household income ranging from \$50,000–\$199,999, while ten respondents declined to share their income status. Lastly, leaders are split evenly between being retired (37%), working full-time (31%), or working part-time (25%).

The following results highlight the role of volunteer leaders in forming and organizing TT groups, including the variety of group structures, associations, goals, and funding sources. Next, we outline leadership structure, collaboration style, availability of salary and hourly contribution. Lastly, an overview of the labor and contributions of leaders is shared, categorized in terms of group organization, tree planting and event coordination, tree care and maintenance and environmental education and awareness.

Group Structure

Around 60% of survey respondents are involved in groups associated with civic organizations or are small, nonprofit organizations with current or pending 501(c)3/4 status

Table 1. TT leader demographics.

Classification	TT Leaders	
	<i>n</i>	% of responses (<i>n</i> = 50)
Gender		
Male	19	39
Female	30	61
Race		
Hispanic, Latino or Spanish	10	20
White (Not Hispanic, Latino or Spanish)	36	73
Black or African American	3	6
Asian	0	0
Native Hawaiian or other Pacific Islander	0	0
American Indian or Alaskan Native	0	0
Age		
18 to 30 years old	3	6
31 to 45 years old	6	12
46 to 60 years old	15	31
Over 60 years old	25	51
Household Income		
Less than \$25,000	3	6
\$25,000 to \$49,999	4	8
\$50,000 to \$99,999	16	33
\$100,000 to \$199,999	12	25
\$200,000 or more	3	6
Prefer not to say	10	21
Employment		
Employed full-time	15	31
Employed part-time	12	25
Seeking opportunities	3	6
Retired	18	37
Prefer not to say	1	2
Years in current neighborhood		
0-5 years	4	8
6-10 years	5	10
11-20 years	11	22
21+ years	28	57
Prefer not to say	1	2

(See Table 2). Around half of groups reported working out of a larger organization, which included a majority of civic or neighborhood association groups and a few associated with environmental groups, city governments (such as city councils, municipality, or borough), community development corporations (CDCs), churches and parks.

When asked to describe the main goals and priorities of their group, increasing the tree canopy and number of trees within of their community was a key priority of 41 survey respondents. Over one fourth of leaders described the need to continue educating fellow residents about the benefits of trees and the need to improve the health and maintenance of existing trees. A few listed the desire to promote community-building through tree planting, as well as raising the importance of increasing green spaces within their community. Other mentions included increasing shade, planting to combat the effects of climate change, restoring biodiversity, and prioritizing planting for residents who have been historically excluded, including equity concerns. Promoting broad participation in environmental stewardship is also an important priority for many groups.

Less than half of the leaders reported that their group had funding, with an average estimated annual budget of \$2,656 for those who responded with a specific number. The highest budget listed was \$15,000, while the lowest was \$120. Out of those groups with funding, the main sources were government agencies, followed by fundraising, the support of foundations, individual memberships, fees/program income, church support, corporate giving/sponsorship from local businesses and homeowner's association (See Table 3). Suburban groups had greater access to government funding than Philadelphia groups, while the latter had more funding from community groups. However, around 40% of all respondents did not report details regarding funding or estimated annual budgets. A few responded that funding was inconsistent due to

Table 2. TT group organization association.

Group Association	TT Groups	
	<i>n</i>	% of responses (n = 50)
Group with or applied for 501(c)3 or 501(c)4 status	13	25
School-affiliated community group	2	4
Religious congregation	1	2
Private firm or for-profit business	0	0
Municipal agency	2	4
Environmental advisory council/board	2	4
Shade Tree Commission (suburban only)	6	12
Civic Association or community group	18	35
Individuals not associated with Organization	7	14

Table 3. Main funding source for TT groups over the past two years.

Funding Source	TT Groups	
	<i>n</i>	% of responses (n = 50)
Government Agencies	15	30
Foundations	5	10
Individual Membership	4	8
Fees/Program Income	3	6
Corporate Giving/Sponsorship	2	4
Churches	2	4
Fundraising Events	8	16
Homeowners Association	1	2

individual donations or the availability of mini grants or suggested that their group's budget varies year to year depending on specific tree-planting projects.

Overall, finding a source of income was described as important for running a successful group. However, the need for funding was also frustrating for leaders who felt they lacked the time or capacity to apply for grants. One leader stated, "we were going to apply for another [grant] specifically for a TT group. But I had a new job and I just couldn't put the time in." This example highlights the challenge for leaders to balance paid work along with their volunteer duties, as 56% of respondents work either full or part-time.

Leadership Structure

Twenty-eight survey respondents (53%) shared that the leadership structure of their group was a joint or shared leadership structure (responsibilities shared between two or more leaders), however there were 11 'other' answers submitted. These submitted responses highlighted the complexity of leadership style. For example, one leader responded, "Although I am the coordinator, I eagerly and appreciatively seek the input of the rest of the members". When asked, "What kind of tasks do you delegate to others", a collaborative leadership style was again emphasized, as a few reported they "share in all tasks, though I do most of the communicating with PHS and other officials" or "we have a fluid structure and work together very, very well as a team". These responses suggest that leaders might consider themselves a 'point' person of the group rather than the someone who solely makes decisions. Twenty-two percent of survey respondents reported that they were the only leader of the group by answering 'just me' when asked "what is the current leadership structure in your TT group". One of the solo leaders expressed frustration, noting: "If I do not initiate an activity or promotion, I would not hear from anyone".

Almost all leaders are volunteers, with 96% reporting they are not paid for their work as a leader. Two suburban respondents reported that they were paid, including one public works employee and one borough employee. More than half of survey respondents reported to have been a leader for four years or more and have been a volunteer in the TT program for longer.

Labor and Stewardship Activities Contributed by Leaders

When asked to "indicate the average number of hours per week you personally contribute to your work as a TT leader season-to-season", around 50% of survey respondents reported a range of two to five hours per week in both spring and fall (See [Figure 1](#)). Leaders worked less hours per week in the winter and summer, with 60% of respondents reporting less than one hour per week in the winter and 52% of respondents in the summer. Slightly more survey respondents (26%) worked two to five hours in the summer, as compared to 14% in the winter. This is not surprising given that groups do not hold tree-planting events during these seasons. Out of all the seasons, fall appeared to be the busiest season for leaders, with slightly more respondents (26%) reporting spending more than 6 hours each week on tree planting activities than spring (22%).

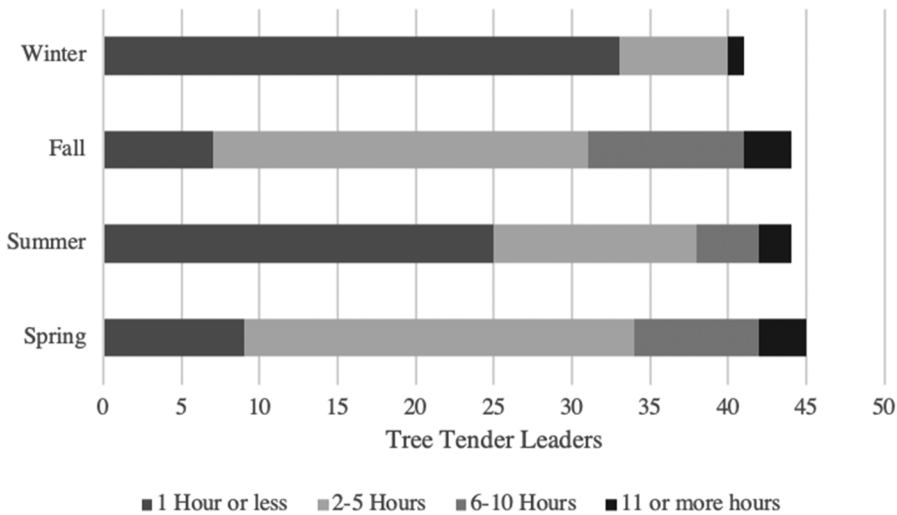


Figure 1. Average hours worked per week.

Leaders reported that their work always includes planting trees, educating people about tree planting and care, recruiting people to plant trees, and coordinating with PHS staff and city or municipal employees. For the most part, leaders answered that their work sometimes includes recruiting people to plant trees, coordinating with PHS staff, coordinating with other city organizations and Tree Checkers. The tasks that leaders most frequently reported that their work ‘never’ includes was coordinating with city/municipal/county staff, pruning trees and pit care (See Table 4). Overall, we found that the labor contributed by leaders contains the following categories: group organization and communication, tree-planting and event coordination, tree care and maintenance, and broader environmental education and advocacy.

Group Organization

A key leadership role is acting as a ‘point person’ between PHS staff members and the TT group. This includes responsibilities such as responding to emails from PHS staff, overseeing tree applications, growing group membership, and managing volunteers for tree-planting events. Over 71% of survey respondents do not have regular meetings and instead meet as needed to focus on planting and educating on tree stewardship and care. When groups do hold meetings, discussions often include planning for future tree-planting events (such as discussing applications for street trees), reviewing the health of trees planted, scouting empty tree pits to plant (for street trees), discussing ways to encourage more planting from residents, and discussing finance or fundraising goals. Other activities mentioned include setting goals for planting, networking with municipality leaders, and working on volunteer development.

Growing group membership within local communities is another goal that leaders described as important for group leadership. Thirty-five percent of survey respondents reported having regular volunteers (those who routinely volunteer in a group’s activities, different from volunteers who may come out for a single workday). However, leaders suggested that these numbers are not sufficient for long-term success. When asked

Table 4. Frequency of tasks reported by TT leaders.

Task Classification	% of responses (n = 50)				
	Always	Most of the time	About half of the time	Sometimes	Never
Recruiting people to plant trees	28	2	14	50	2
Educating people about tree planting and care	34	6	8	46	2
Coordinating with PHS staff	26	6	8	54	2
Coordinating with city/municipal/county staff	18	10	6	36	26
Coordinating with other organizations (such as civic organizations, schools, businesses)	8	4	10	62	12
Planting trees	42	6	20	28	0
Watering trees	16	10	12	40	16
Pruning trees	18	0	12	42	24
Pit care (such as mulching, aerating soil)	12	6	20	36	20
Tree checking (monitoring after planting)	20	6	12	48	2

“What are the most common barriers and challenges your TT group faces regarding tree planting and stewardship in your neighborhood,” 35% of respondents listed a lack of interest from volunteers as a barrier. Here, leaders speculated that a general lack of time and energy could be to blame. One leader wrote, “[volunteers] don’t have the same intensity of involvement. And perhaps, they don’t have the time either,” while another stated simply that there are “not enough dedicated long-term volunteers.” Another respondent described the frustration that their group has been unable to expand due to a lack of new membership; “The major barrier to us expanding beyond our current capacity is lack of volunteers in our group. If we had more hands, we could plant more trees; however, we may also not have the time to expand.”

Leaders themselves also described burnout with group organizational tasks and feeling frustrated by a lack of interest and help from other group members. As one leader shared, “I find it difficult to keep up with the demands of the leader responsibilities due to a demanding job and as I get older, I have less energy and less physical strength. It would be great to have more help from other members of our TT group to take on more organizational, planting day, and follow up care (tree checking and pruning) responsibilities. I have asked but folks haven’t really responded to take on bigger roles”. Respondents described being persuaded to become a leader after a previous one had stepped down or feeling the pressure to lead because they felt that “no one else would do it” if they did not take on leadership responsibilities to help grow tree canopy in their respective neighborhoods. Another leader wrote, “To be honest, I really didn’t want to be a group leader, I just wanted to plant trees.” This suggest that leaders are not only responsible for planting, but rather conduct a larger range of group leadership activities that can become a point of contention for leaders.

Tree-Planting and Event Coordination

As part of their work leading a group, activities regarding tree-planting events appear to be the most time-consuming and require event coordination skills by leaders. Leaders

described how the work involved in finding available tree pits and getting fellow neighbors to fill out an application for a tree from PHS often required sales or marketing skills. One leader described that one must be “willing to do whatever is necessary to get the permission form signed” to be successful in increasing tree-planting opportunities, while another wrote that leaders must possess “sales skills in ‘selling’ trees and steering people to the right tree in the right place.”

Marketing skills and the ability to use social media as a platform for tree planting was also described as useful for leaders. For example, a few respondents described learning to develop press releases with local news organizations or create websites to “help get the word out” regarding tree applications. Leaders also created flyers and other marketing materials to pass out to homeowners and residents. A few leaders even write articles themselves for local association newspapers or newsletters to promote their group’s activities and ask for applications. This outreach also included having the time to talk and listen to others regarding trees in general. As one leader described, this work could be slow, and leaders needed to have the patience and “willingness to talk to everyone in the community [and to] talk to people as you are working on the trees and explain what you are doing and why.” Leaders also described the importance of having empathy for community members with negative tree experiences and making sure neighbors feel heard before pushing tree applications.

Next, leaders contribute significant organization and communication skills to organize tree-planting days, where group members and other volunteers get together to collect and plant trees over a three-day period. Prepping for this day requires event coordination skills, including working with wide variety of actors. Leaders must coordinate with other group members to recruit volunteers for the day of planting, arrange for the pick-up and delivery of materials and trees, and supervise the tree planting events. Twenty-one percent of survey respondents mentioned how the ability to manage, recruit and coordinate volunteers efficiently was essential for success. Day-of planning responsibilities can also include reaching out to other local organizations and business for sponsorship, and gathering materials, such as food or drink for volunteers.

Thirty-four percent of survey respondents also provide the tools for tree-planting and maintenance themselves or help arrange for other group members to bring tools. A few leaders have worked to create a shared a tool-library for group members and have described how building connections with other organization was necessary to help secure storage for these materials, as well as provide the funds to purchase these tools and materials.

Tree Care and Maintenance

Monitoring trees and general tree maintenance (pit care, pruning, watering etc.) was also one of the most frequently listed tasks described by respondents who delegate and oversee with other members in their group (22 responses). These tasks include removing stakes, connecting with tree recipients, and mulching and weeding tree pits. However, when asked specifically if their group has a formal prune or pit care club, 69% of survey respondents reported no official pruning club and 90% reported no pit care group existed within their group.

Despite the efforts leaders put into post-planting maintenance of trees, leaders find themselves limited in their ability to carry out maintenance. One leader wrote “I

struggle with finding the time and energy to complete the follow up duties required by PHS.” Respondents shared concern regarding the ‘lack of care’ that goes into watering and checking in on trees with both residents and businesses. When asked “typically, who is responsible for post-planting maintenance of trees, for the first year after planting?” most reported that residential tree recipients are responsible (76%), followed by TT groups members (52%), and local business/intuition/park tree recipients (46%). However, 52% of survey respondents reported that they are involved in tree care, either through aiding tree recipients or organizing ‘unofficial’ pit care and pruning events.

Leaders also reported that they communicate with tree-recipients a few times a year after the initial tree planting, particularly as water is needed and as weather requires. Post-planting care and maintenance was the frequently reported topic. Data input was also mentioned as a task leaders and group members take on, such as keeping a survey of empty tree pits in the neighborhood or inputting tree monitoring data into PHS’s online cloud platform for Tree Checkers. As a result, good technology and communication skills were mentioned as necessary to succeed in leadership work by 11% of respondents, particularly among social media sites. These tasks also caused frustration among leaders. For example, one described “I don’t love being a leader as the technology almost pushes me to the breaking point.” Another respondent shared feedback that they “found the new on-line reporting confusing, cumbersome and very difficult to use,” and thus a time-consuming task for leaders.

Environmental Education and Advocacy

Leaders are also involved with other greening activities and environmental advocacy efforts. Several leaders described general tree canopy awareness efforts, and 15% of survey respondents explained the importance of educating others regarding tree care and the need to increase tree canopy. For example, 28% of suburban respondents also serve as part of their local STC, while most of Philadelphia respondents participate in TT committee meetings. One leader described that they “write letters and/or testify at hearings regarding funding of trees, parks, etc.” to build community support for TPIs.

Regular collaboration on tree planting and stewardship activities with a wide variety of community organizations was also reported by leaders. The most common collaborators were park groups (such as friends of parks, cemeteries, arboretums), followed by public works or township employees for suburban groups, other groups/leaders and community organizations, such as local CDCs, and community gardens. Thirty-five survey respondents said they regularly collaborate with at least one other organization, while four responses said they did not collaborate with any groups. Twenty-one percent of survey respondents described how having good people skills was necessary to work collaboratively with a wide variety of actors, including working to establish good relationships with local government agencies (13%) and businesses/developers in the area (4%).

Thirty percent of survey respondents also reported that they work to increase their own knowledge and expertise related to trees. One leader described, “to be a successful TT group leader, you must be passionate about arboriculture and continually educating yourself on best practices.” Leaders attend trainings run by PHS staff to stay up to date on protocols and methods related to tree planting and care. They also valued collaboration and communication with other leaders and PHS team members.

Discussion

We found that volunteer leaders are taking on a significant role in leading their local TPIs, including spearheading a variety of environmental stewardship activities beyond tree-planting, contributing hours weekly on leadership and planting activities, and utilizing relationships with a wide variety of actors, including government agencies and nonprofit organizations. Our results reveal that leaders often develop formalized group structures to help accomplish tree planting tasks, such as forming their own 501(c)3 organization or functioning as part of a larger organization like a civic association or neighborhood-based nonprofit. Considering that 94% of leaders in our study were not paid for their work, we found that leaders are contributing a substantial amount of unpaid labor, generally on top of other work or personal responsibilities. Additionally, leaders are actively applying for grants and finding external funding to cover tree-planting costs and support group activities, with government and foundations as the most common sources of funding. Grant funding remains an important resource for volunteer groups, however the short-term nature and varied availability of these funding sources continue to challenge long-term sustainability of stewardship group activities (Svendsen and Campbell 2008). Less than half of leaders reported having current access to funding, and in some cases, volunteers may be taking on the certain costs of the TPI themselves, as seen in those who supply tools or equipment. Thus, the financial contributions of leaders, including contributing time, unpaid labor, and their own resources, remains significant, as observed by Daniels et al. (2014) in environmental stewardship work.

We also found that leaders participate in a wide variety of activities beyond tree planting, including tree maintenance and data collection, which aligns with nationwide trends of municipal forestry volunteer activity reported by Hauer et al. (2018). The range of activities that leaders reported to engage in highlights the complexity of the labor required to be a volunteer community leader in urban forestry. Tree planting remains the focus of TT groups, as seen in the hours reported during the spring and fall seasons. However, our results reveal that leaders are spearheading a wider range of environmental stewardship and community building activities, such as building connection between neighbors, collaborating with other community organizations, maintaining records of their neighborhood tree canopy, advocating for urban greening and planning events around tree maintenance and care. Similarly, research conducted in Massachusetts by Geron et al. (2023) found a range of involvement of resident tree recipients in a state-managed TPI, including active participants who promoted tree planting among neighbors and took on care of trees that were not their own. In the case of TT leaders, we found residents to be taking on active and time-consuming roles to become engaged stakeholders in TPIs and subsequent leaders of their neighborhood environmental stewardship activities. These contributions align with understandings of environmental stewardship more broadly (Svendsen and Campbell 2008), and the ways in which urban green infrastructure is co-produced by resident actors and bridge organizations (Campbell 2017; Campbell et al. 2022a; Connolly et al. 2013; Pincetl et al. 2013). Our results also reveal volunteers who remain engaged in shaping their surrounding urban environments, both before and after the initial tree planting.

While community leaders play an important role in supporting municipal tree activities (Hauer et al. 2018), leaders may struggle with the range of tasks associated with leadership and group structure, and the responsibility of long-term tree maintenance and monitoring, rather than activities associated with tree planting. Additionally, participants described being both passionate and interested in tree planting but faced a lack of community support to aid in planning and leadership efforts. Many leaders felt as if they were the ‘only’ one who would step up to lead within their neighborhood or were ‘asked’ to take on this role by others. Studies on volunteer motivation have found that volunteers often strive to create positive change and deeper social connections within their communities (Foster 2021; Johnson et al. 2018), but may also face cultural and social barriers when promoting TPIs and enlisting support among residents (Riedman et al. 2022). Leaders can encounter varying community perception of barriers to tree planting and preference for specific types of trees (Dawes et al. 2018), experiences with tree disservices and historical municipal neglect of tree maintenance (Carmichael and McDonough 2019; Roman et al. 2020). In other urban forestry programs, staff express a desire for increased general education and awareness of tree benefits (Driscoll et al. 2015; Nguyen et al. 2017; Stevenson, Gerhold, and Elmendorf 2008), which may be responding to resident concerns about tree problems and tree care. In our study, we found that leaders may face additional barriers when promoting community participation in TPIs, not only to plant or care for trees, but to recruit participants and plan events. As a result, the long-term sustainability of volunteer-led TPIs is a concern for many leaders, particularly as they look to hand over their leadership responsibilities overtime.

Studies on TPIs highlight the success of program strategies that provide support for tree maintenance to improve stewardship and survival of tree plantings on residential properties, either through increased municipal staffing, funding for community groups or dedicated volunteers to aid with consistent tree care (Breger et al. 2019; Nguyen et al. 2017; Roman et al. 2015, 2018). In our study, leaders described the need for additional support with group organization, communication, and data-monitoring technology. Leaders expressed the most frustration with tasks such as communicating with volunteers and tree recipients, applying for grants and planning tree planting events. Leaders had trouble understanding the technology used for tree planting requests and monitoring or having the time to participate in data collection activities. Combined with other challenges that urban forestry stakeholders may face, including community engagement, volunteer recruitment and promoting tree health and survival, these frustrations can lead to burn out among leaders and may prevent those who lack these administrative skills from becoming leaders.

Leadership challenges can also contribute to barriers within recognitional green equity, where limited capacity to contribute volunteer labor and the necessary skills to lead groups may prevent fair and diverse representation among community stakeholders within urban forestry decision-making processes (Nesbitt et al. 2018). The demographics of our survey participants reflect similar studies that show an over-representation of white women (Elton et al. 2022; Fisher et al. 2011; Johnson et al. 2018; Moskell, Allred, and Ferenz 2010). Our findings build upon this prior scholarship to reveal that white and retired women who have lived in their neighborhoods for over 21 years are also more likely to become leaders within this volunteer

initiatives. A high representation of white, retired women as leaders when compared to greater Philadelphia's populations suggests possible race, class, and age gaps in who is available to participate and lead tree-planting efforts. While retired volunteers may have greater capacity to lead groups, leaders over the age of 60 years may struggle to complete physical tasks associated with tree planting or to recruit younger membership in transitioning leadership. Despite these challenges, older women continue to be a leading force in community care work and volunteerism within urban communities, building off a long history of women who have contributed to the collective care of public spaces as sites of resistance, empowerment, and justice (Brownlow 2012; DümpeImann 2015; McNulty and Roman 2022; Taylor 2009). To support inclusive urban forestry in diverse urban communities, further research is needed on the historical and present-day volunteer labor contributions of a range of identities, in particular women of color.

The demographic differences in participation suggest that some TPIs can struggle to find community members or groups with the capacity to take on tree-planting leadership. A recent study by Coleman et al. (2023) examining the link between residential satisfaction and participation within TPIs found that residents with a low satisfaction with the amount of street trees and civic amenities were more likely to exhibit a desire to volunteer at tree planting events, but not necessarily become a leader. Studies on the distribution of urban park and green space funding have shown an inequitable distribution of grant funding among low-income communities of color (Joassart-Marcelli, Wolch, and Salim 2011), and point to a possible gap in access to knowledge, technical skills and resources required for many grant applications and funding opportunities. Certain communities may encounter more frequent barriers to community engagement, particularly the ability to provide the volunteer hours needed to lead TPIs (Gonzales et al. 2016; Riedman et al. 2022). Researchers continue to call for a greater emphasis of recognitional and procedural justice concerns within urban forestry programs and plans (Campbell et al. 2022b, Eisenman et al. 2021; Foster, Dunham, and Bukowska 2022; Grant et al. 2022; Nesbitt et al. 2018), and provide a framework in which to understand differences in environmental stewardship without calling into question motivation or a lack of desire for green space. Further scholarship is needed regarding the equity in TPIs, especially considerations for the roles of community leaders in marginalized and under-resourced communities, and the challenges these leaders may face in contributing volunteer labor. Additionally, this work should include a focus community forestry within a range of geographic contexts, including suburban and mid-size environments, as seen in a recent study by Healy et al. (2023) of municipal urban forest management within midsize towns in Massachusetts.

Conclusion

Each year TT groups, which are almost entirely comprised of volunteers, are responsible for planting thousands of trees in the greater Philadelphia area. Essential to this effort is the multi-faceted labor contributed by TT leaders, who play a substantial role in the maintenance and development of the urban tree canopy. Collectively, volunteer leaders create formalized volunteer groups, apply for grants, and participate in a wide range of environmental stewardship activities, investing skills, time, and labor into the

success of TPIs beyond work and personal commitments. Volunteer leaders can face challenges related to leadership and group structure and sometimes struggle with the technology and skills required for grant applications and data management tasks. Leaders can also struggle with the demand of activities related to event planning, environmental education, and group leadership, in addition to tree-planting and care, particularly as this remains unpaid work. Leaders described the need for additional support for technology and skills required for grant applications and data management tasks. These labor challenges, along with demographic differences within volunteer leaders, suggest possible challenges for advancing equitable community recognition and leadership within TPIs.

A deeper understanding of the relationship between volunteer labor and paid, municipal or organizational staff may be beneficial in future research for addressing these inequities. Scholars have begun to call for a more collaborative approach to the governance of urban forests, one in which stewardship is not entirely passed onto community organizations but rather supported and co-produced with municipal actors (Campbell et al. 2022b; Sousa-Silva et al. 2023). Harper et al. (2018) affirms this call for greater support for tree planting leaders, including more training opportunities, resources, and general appreciation for the labor of these volunteers. Certain tasks can be taken on by paid, municipal program staff (Nguyen et al. 2017), who may utilize organizational resources and expertise to help apply for additional grants or facilitate connections between volunteers and community funding opportunities.

Currently, many TPIs receive funding from public-private sources to aid in the purchasing of trees and support other tree planting costs. However, a few urban forestry funders, such as the Tree Equity Workforce Network (TEWN) supported by American Forests, have begun to offer more diverse funding to support workforce development and community tree care as a means of addressing gaps in tree care employment. Other municipal-supported programs are beginning to offer part-time paid, tree care positions, like Los Angeles' Tree Ambassador 10-week paid training program that aims to support care for trees in historically disinvested communities (de Guzman, Escobedo, and O'Leary 2022). Increased funding for paid labor continues to become a priority for those supporting equitable urban tree canopy growth. The City of Philadelphia's new strategic plan, *Philly Tree Plan: Growing our Urban Forest* (2023), argues for new municipal and other community paid positions, including a City Forester and support team aimed at coordinating all tree-related programs and activities, particularly among city agencies and community stakeholders. The plan also recognizes the importance of volunteer stewardship and advocates for volunteer stipends. In the case of the TT program, our findings highlight the importance of volunteer leaders, while also revealing the needs and challenges that need to be addressed in the future growth of any equitable, community-led TPIs.

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