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Motivations, Environmental Attitudes, and Personal Efficacy of Volunteers at CommuniTree Tree-Planting Events in Northwest Indiana, U.S.

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Motivations, Environmental Attitudes, and Personal Efficacy of Volunteers at CommuniTree Tree-Planting Events in Northwest Indiana, U.S.

In this paper, we examine the mechanisms of volunteering at tree-planting events conducted as part of a new, multi-organizational tree-planting effort in northwest Indiana called CommuniTree. A broad literature exists on general volunteerism as well as environmental volunteering, urban forestry volunteering, and even tree-planting volunteering. Yet, the motivations, environmental attitudes, and personal efficacy of urban forestry volunteers in particular are not fully understood, nor are the outcomes and implications of volunteer participation in neighborhood greening programs. A 22-question (34 individual items), self-report survey was administered in-person at CommuniTree tree-planting events in 2017 through 2019, obtaining 114 responses. CommuniTree volunteers who responded to our survey are mostly white, male, full-time students of college age (18-24), who came to the tree planting by way of their university professor or a friend or family member telling them about it. Volunteers who completed our survey were motivated by intrinsic factors including a desire to help the community and a desire to help the environment, as well as extrinsic factors such as to complete community service hours, receive school-related extra credit, or as required through their employer's partnership with CommuniTree. Additionally, volunteers report high rates of pro-environmental behavior, a high-level understanding of environmental issues, and high personal efficacy. Here, we frame our results in terms of the Volunteer Process Model's three phases of volunteerism, and thereby consider the *antecedents* or prior conditions, *experiences*, and *consequences* or outcomes of volunteering in the context of respondent motivations, attitudes, knowledge, personal efficacy, and self-reported benefits and drawbacks of trees.

Keywords

Tree planting, urban forestry, volunteering, volunteerism, volunteer motivations, volunteer process model

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DISCIPLINARY INFLUENCES DISCLAIMER All scientific research is conducted within the worldview of its personnel, who are trained in particular academic disciplines. For transdisciplinary research of the sort presented above, these disciplinary backgrounds and paradigms can yield biases and omissions (Vogt, 2018). Any omissions of relevant literature, methods, or theory – either intentional or unintentional – are likely due to the necessary blinders we wear as scholars and students of these fields. For this paper, we draw primarily from scholarship on volunteering (including volunteer motivations and the volunteer process model), personal efficacy, urban forestry, and environmental stewardship literature broadly. ACKNOWLEDGEMENTS The larger CommuniTree research project at LUFA, the Lab for Urban Forestry in the Anthropocene has been supported by funding from the Irwin W. Steans Center for Community-Based Service Learning & Community Service Studies and the College of Science & Health (CSH) Undergraduate Research Assistantship Program (URAP) and the CSH Faculty Summer Research Program, all at DePaul University. We are grateful to the DePaul undergraduate students who participated in the original design of the CommuniTree research – including the first draft of the volunteer survey – during the Spring 2017 ENV 261 Mixed Methods course at DePaul University: Rebecca Brokaw (an author on this paper), Grace Carollo, Mikaila Davis, Rose Doherty, Jaclyn Meyers, Kaitlyn Pike, and Carmen Valencia. The preliminary ComuniTree survey research was completed as part of author Rebecca Brokaw's senior thesis for completion of the Environmental Science major, Bachelor's of Science degree at DePaul University. Finally, we are grateful to CommuniTree organizer Drew Hart for his encouragement and support of CommuniTree research. Full updates on the CommuniTree research project can be found at the LUFA website: www.lufa-depaul.org. AUTHOR CONTRIBUTION CRediT STATEMENT Author contributions for the above work, as defined by the Contributor Roles Taxonomy (https://casrai.org/credit/), are as follows: Kaitlyn Pike (pronouns: she/her/hers), graduate research assistant, LUFA, the Lab for Urban Forestry in the Anthropocene: Conceptualization, Investigation, Data curation, Formal analysis, Validation, Writing-

original draft, Writing-review and editing. Rebecca Brokaw (pronouns: she/her/hers), undergraduate research assistant, LUFA: Conceptualization, Investigation, Methodology, Investigation, Data curation, Writing-review and editing. Jess Vogt (pronouns: she/her/hers), principal investigator, LUFA, the Lab for Urban Forestry in the Anthropocene, and assistant professor, Department of Environmental Science and Studies, DePaul University: Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Writing-review and editing, Project administration, Funding acquisition.

INTRODUCTION

Urban forestry volunteers play a vital role in their communities by engaging in tree planting, tree maintenance (including watering or pruning), tree inventories, or by advocating on behalf of urban forestry needs and goals. People are called to volunteer for many reasons, and urban forestry groups may choose to involve volunteers in their programming for many reasons. Yet, the motivations, attitudes, and personal efficacy of urban forestry volunteers are not fully understood, nor are the outcomes and implications of volunteer participation in neighborhood greening programs.

In this paper, we examine the motivations for and mechanisms of volunteering at tree planting events that were conducted between fall 2017 through spring 2019 as part of a new, multi-organizational tree planting partnership in Northwest Indiana called CommuniTree. In the sections that follow, we review the literature on volunteerism, broadly at first, and then more specifically through the lens of urban forestry. This is followed by an examination of volunteer motivations, the influence of motivations on personal efficacy, and an explanation of the volunteer process model (Snyder and Omoto, 2008), which we find particularly helpful to understanding the suite of factors that influence volunteering and volunteerism. Next, we present methods and results of survey research conducted to examine the socio-demographic characteristics and motivations (inclusive of environmental attitudes and personal efficacy) of volunteers at CommuniTree events in Northwest Indiana. Finally, we situate our results in the context of existing literature and use the volunteer process model (*ibid.*) to describe volunteering in the context of the CommuniTree program.

Volunteerism

Volunteering has been defined as "freely chosen helping activities that extend over time and that are often performed through organizations and on behalf of receptive causes or individuals" (Snyder and Omoto, 2008, p. 3). In 2017 (the most recent year for which data is available), nearly 1 in 4 (23.8%) United States citizens volunteered for a total of 6.9 billion hours, providing $167 billion-worth of services (CNCS, 2018). In the Chicago metropolitan area – where our study communities are located – 25.6% of the population engaged in volunteering in 2017 (*ibid.*). Volunteers are found to donate twice as much to charitable causes; are three times more likely to do something good for their neighborhood; and are twice as likely to do a favor for a neighbor compared to non-volunteers (*ibid.*).

Empirical research has demonstrated that the benefits of volunteering for the individual include improved mental health and decreased incidence and severity of mental illness, decreased morbidity and mortality risk, increased life span, increased educational opportunity, improved likelihood of obtaining higher degrees, and the possibility of career advancement and increased income level (as reviewed in Wilson, 2012). Volunteers are also more likely to report higher self-esteem, self-efficacy, and social connectedness (Brown, Hoye, and Nicholson, 2012). Those that engage in volunteer service may improve their knowledge about a particular subject matter or gain a skill as practiced during their volunteer work (Snyder and Omoto 2008). Thus, volunteers are more likely to find a job after being unemployed, particularly if they lack a high-school diploma or live in a rural area (CNCS, 2018).

Studies have found that volunteering can make for more engaged residents, better place-making, and a stronger sense of community (Sladowski, Heintz, and MacKenzie, 2013). At a community level, volunteers may become more connected to their communities and contribute to building social networks for themselves and the broader community (Snyder and Omoto 2008), the result of which fosters healthier, more resilient communities with residents and groups more able to respond to disasters and emergencies (Sladowski, Heintz, and MacKenzie, 2013).

Volunteerism and Urban Forestry

Volunteers are called upon quite frequently in urban forestry. Urban forestry considers the planting and management of urban trees, forests, and associated resources in the cities, towns, and communities where people live, work, and play. Volunteers often plant, maintain (e.g., prune, water, mulch), inventory, and/or monitor urban trees. A 2016 census of municipal forestry programs across the United States found that: 1) nearly 5% of municipal tree care activities were conducted by volunteers; 2) 85% of communities surveyed reported engaging volunteers in tree planting, while 40% of communities engaged volunteers in watering activities, 39% in education programs, 28% in tree pruning, and 20% in fundraising; and 3) in total, nearly 350 million people volunteered close to 1.5 million hours of municipal tree care activities (Hauer et al., 2018).

Individual studies have empirically examined a number of aspects related to the use of volunteers in urban forestry. Studies examining the costs and benefits of using volunteers to conduct urban forest inventories have found that the accuracy of trained volunteers is sufficiently high to produce useful inventory results (Bloniarz and Ryan, 1996). Similar observations have been made for "virtual inventories" conducted using Google Street View™ imagery (Berland, Roman, and Vogt, 2018), and numerous other authors have examined the use of volunteers to collect scientific data in urban forest civic or community science efforts (Roman et al., 2017).

Motivations for Volunteering

Volunteer motivations can oftentimes be categorized as either 'self-focused' or 'other-focused' (Snyder and Omoto, 2008). Self-focused motivations benefit the individual and include the desire to gain knowledge or understanding, obtain personal development or growth, enhance self-esteem, or advance a career. Other-focused motivations are tied to personal values and include the desire to help the broader community. In a non-exhaustive review of the literature conducted for this paper (Table 1), the motivations of environmental volunteers were attributed to 9 major themes: career advancement, community contribution, environmental stewardship, a feeling of doing something useful, a desire to learn, personal development, attachment to place, social interaction, and personal values, esteem and ego. The most common motivation that environmental volunteers described was self-focused – a desire to learn something. This was followed by the desire for social interaction (a self-focused motivation) and the desire to help the environment (an other-focused motivation). Across the literature, we found that self-focused motivations – rather than other-focused motivations – were more commonly cited by volunteers as reasons to engage in volunteer service in an environmental context.

Table 1. Motivations of environmental volunteers from select literature. Nine major themes were found to be significant from 11 studies on environmental, urban conservation, and urban forestry volunteering. Self-focused volunteerism was most commonly cited as a motivating factor when looking at all groups collectively.

Motivations	Focus	Type of Volunteerism	Source
Career-related	Self	Environmental; Urban conservation; Urban forestry	Westphal, 1993; Bruyere and Rappe, 2007; Asah and Blahna, 2012; 2013
Community-driven	Other	Environmental; Urban conservation; Urban forestry	Still and Gerhold, 1997; Austin, 2002; Measham and Barnett, 2008; Moskell, Allred, and Ferenz, 2010; Asah and Blahna, 2012; Asah and Blahna, 2013
Environmental stewardship	Other	Environmental; Urban conservation; Urban forestry	Westphal, 1993; Grese et al., 2000; Ryan, Kaplan, and Grese, 2001; Austin, 2002; Bruyere and Rappe, 2007; Measham and Barnett, 2008; Moskell, Allred, and Ferenz, 2010; Asah and Blahna, 2012; Asah and Blahna, 2013
Feeling of doing something useful / wanting to contribute	Other	Environmental; Urban forestry	Ryan, Kaplan, and Grese, 2001; Johnson et al., 2018
Learning-related	Self	Environmental; Urban conservation; Urban forestry	Westphal, 1993; Still and Gerhold, 1997; Ryan, Kaplan, and Grese, 2001; Austin, 2002; Bruyere and Rappe, 2007; Measham and Barnett, 2008; Moskell, Allred, and Ferenz, 2010; Asah and Blahna, 2012; Asah and Blahna, 2013; Johnson et al., 2018
Personal development	Self	Environmental; Urban forestry	Grese et al., 2000; Ryan, Kaplan, and Grese, 2001; Austin, 2002; Measham and Barnett, 2008; Asah and Blahna, 2012; Asah and Blahna, 2013; Johnson et al., 2018
Place attachment	Self	Environmental; Urban forestry	Westphal, 1993; Bruyere and Rappe, 2007; Measham and Barnett, 2008; Fisher, Svendsen, and Connolly, 2015
Social interaction	Self	Environmental; Urban forestry	Still and Gerhold, 1997; Grese et al., 2000; Ryan, Kaplan, and Grese, 2001; Austin, 2002; Bruyere and Rappe, 2007; Measham and Barnett, 2008; Asah and Blahna, 2012; Asah and Blanha, 2013; Fisher, Svendsen, and Connolly, 2015
Values, esteem, and ego	Self	Environmental; Urban forestry	Bruyere and Rappe, 2007; Johnson et al., 2018

Motivations can also be used to predict continued involvement and volunteering frequency. Studies have found that self-focused motivations – such as ego defense and enhancement – were significant predictors of general volunteering frequency (Asah and Blahna, 2012), and that personal and social desires were more connected to volunteer retention than other-focused motivations related to the environment (Asah and Blahna, 2013).

Influence of Self-Efficacy on Volunteerism

Efficacy centers around personal and collective beliefs that individuals and groups can affect systemic change in their lives and within their communities. Self-efficacy, or personal efficacy, is understood as the foundation of human motivation, accomplishments, and overall emotional well-being (Bandura, 1997). Individuals with higher levels of perceived personal efficacy have been found to be better equipped with the interpersonal skills to both exert and sustain effort when faced with difficulty (*ibid.*). In contrast, those with low personal efficacy are more likely to experience self-doubt when confronted with challenging situations (*ibid.*). Personal efficacy is a dynamic process – a result of the interaction between one's self and their environment, generally strengthening with each successful attempt to cope when faced with adversity (Patterson and Kelleher, 2005).

Studies have found that an individual's perceived personal efficacy can impact their willingness to engage in volunteerism, particularly for men (Lindenmeier, 2008). Similarly, personal efficacy and motivation are important predictors for a person's intent to volunteer (Wang et al., 2010). Volunteers with higher self-efficacy are also more likely to report greater engagement in the organization they volunteer for (Harp, Scherer, and Allen, 2017). Research surrounding self-efficacy suggests that community participation through acts of volunteering help strengthen connections that individuals have within their neighborhood and can increase their perceived individual and collective capacities (Ohmer, 2007).

Volunteer Process Model

The volunteer process model seeks to understand the confluence of factors that lead individuals to participate and remain engaged in acts of volunteering (Snyder and Omoto, 2008). According to the model, the volunteer process is made up of *antecedents* (happening before, i.e., pre-existing factors), *experiences* (happening during), and *consequences* (happening after, i.e., outcomes) at the individual, interpersonal, organizational, and societal levels (*ibid.,* Table 2).

In alignment with the literature, the model considers *antecedents* such as demographic characteristics, personality traits, socio-cultural factors, and self-interest as relevant factors associated with an individual's propensity to volunteer (*ibid.*). Individuals are also more likely to become engaged in volunteering if they believe their actions can and will serve their motivations. In other words, if an individual is interested in volunteering because they want to help their community, they are more likely to choose an organization that has demonstrated success in community-related service. We consider self-efficacy, discussed above, to be an antecedent factor in our research, but recognize the possibility that volunteering might also build self-efficacy.

Table 2. The volunteer process model is a theoretical conceptualization of the volunteer process guided by a functional approach to personality, motivation, and social behavior. From Snyder and Omoto (2008: p. 7).

Levels of Analysis	**Stages of the Volunteer Process**		
	Antecedents	Experiences	Consequences
Individual	Personality, motivation, life circumstances	Satisfaction, stigma, organizational integration	Knowledge and attitude change, health
Interpersonal / Social Group	Group memberships, norms	Helping relationship, collective esteem	Composition of social network, relationship development
Agency / Organization	Recruitment strategies, training	Organizational culture, volunteer placement	Volunteer retention, work evaluation
Societal / Cultural Context	Ideology, service programs and institutions	Service provisions, program development	Social capital, economic savings

At the *experiences* stage, the volunteer process model explores the interpersonal relationships among volunteers, between volunteers and staff, and between volunteers and the beneficiaries or recipients of their services. It is at the experiences stage that volunteer satisfaction is gauged. Again, the model states that matching the experiences that individuals have while volunteering to the initial motivations they had for volunteering make for a more rewarding experience. For example, if an individual was motivated to volunteer based on a desire to learn something, they will feel more satisfied if they felt like they gained new knowledge from their participation and will thus be more likely to stay engaged and possibly recruit others.

The impacts of volunteer service are examined in the *consequences* stage. For the individual, this includes changes in attitudes, knowledge, and behavior, but this stage also has ramifications for volunteer retention and for the recipients of volunteer services. Volunteers that have positive experiences are oftentimes more fulfilled and are more likely to continue volunteering and more willing to recruit other volunteers. Furthermore, the consequences stage has critical implications for human health through the benefits that giving and receiving of volunteer services provides (Wheeler, Gorey, and Greenblatt, 1998; Thoits and Hewitt, 2001; Brown et al., 2003). Taken as a whole, the antecedent, experience, and consequence stages of the volunteer process model can help understand the suite of factors connected to volunteering.

Study Site and Conceptual Framework

CommuniTree is a collaborative, multi-organizational tree planting partnership in Northwest Indiana, launched in 2016. Initiated by the U.S. Forest Service Chicago Region Natural Resource Liaison and framed by the Collective Impact model for collaboration (Kania and Kramer, 2011; Hanleybrown et al., 2012), CommuniTree draws together various public, private, nonprofit, and partnership organizations throughout the Calumet Region – an area that represents both the Chicago Metropolitan area, as well as Northwest Indiana – to engage in tree planting and care. CommuniTree aims to address regional challenges by promoting the planting and care of trees

with the goal of creating "a healthier and more diverse tree population," as well as a community of tree stewards (http://www.nirpc.org/2040-plan/environment-green-infrastructure/communitree/).

A part of what is referred to as the "Rust Belt" of the United States, Northwest Indiana was of significant economic importance during most of the 20th century for its steel and automobile industries (Pollak, 2016). As both industries began to struggle in the 1970s due to international competition and a decline in domestic manufacturing, a series of inequities emerged that remain present to this day. These inequities include, among others, higher rates of unemployment and lower rates of college graduation (*ibid.*). The cities where CommuniTree started its operations (East Chicago, Gary, and Hammond) have the highest poverty rates in Northwest Indiana (*ibid.*). In East Chicago and Gary, 1 in every 3 people live below the poverty line (*ibid.*). Research has found that neighborhoods with higher proportions of low-income, marginalized groups are more likely to have lower proportions of tree cover (Landry and Chakraborty, 2009) and are disproportionately burdened with environmental hazards such as air pollution (Grineski, Bolin, Boone, 2007; Tessum et al., 2019). CommuniTree seeks to positively impact the Northwest Indiana region by alleviating some of the social and ecological issues these post-industrial communities face. A detailed overview of CommuniTree origins and structure and the social-ecological context in which the initiative operates can be found in Vogt and Abood (2020).

Funded primarily by external grant dollars and industry donations and with the support of at least a dozen partner organizations, CommuniTree plants trees through three modalities: 1) providing free trees to groups such as municipalities, schools, and neighborhood and community groups that complete an application and attend a tree planting workshop; 2) planting directly on private, industrial properties with the collaboration of industry groups; and 3) planting in parks, the public right-of-way along streets, and on other (mostly) public property, led by a paid Student Conservation Association tree crew of young adults from the local communities. In this third planting modality, the tree crew seeks to engage local residents, students, employees from nearby companies, and anyone else who might hear about and show up to a tree planting event. In Figure 1, we conceptualize volunteer motivations and volunteer participation as contributing to CommuniTree's capacity for tree planting.

Within this framework, the research described in this paper seeks to understand the motivations (inclusive of environmental attitudes and personal efficacy) of CommuniTree volunteers with the aim to assist the organization in recognizing what populations they are reaching and where there may be gaps in volunteer and community engagement. This research is guided by an applied, transdisciplinary (interdisciplinary academic research that involves practitioners), mixed methods research design (Vogt and Abood, 2020) and the volunteer process model (Snyder and Omoto, 2008) to evaluate the following research questions:

1) Who are the volunteers involved with CommuniTree?
2) Why are volunteers *motivated* to be involved with CommuniTree?
3) What are volunteers' *desired outcomes* of the CommuniTree program?
4) What *gaps* are there in who participates in and benefits from CommuniTree?
5) How might new participants *be engaged* in CommuniTree?

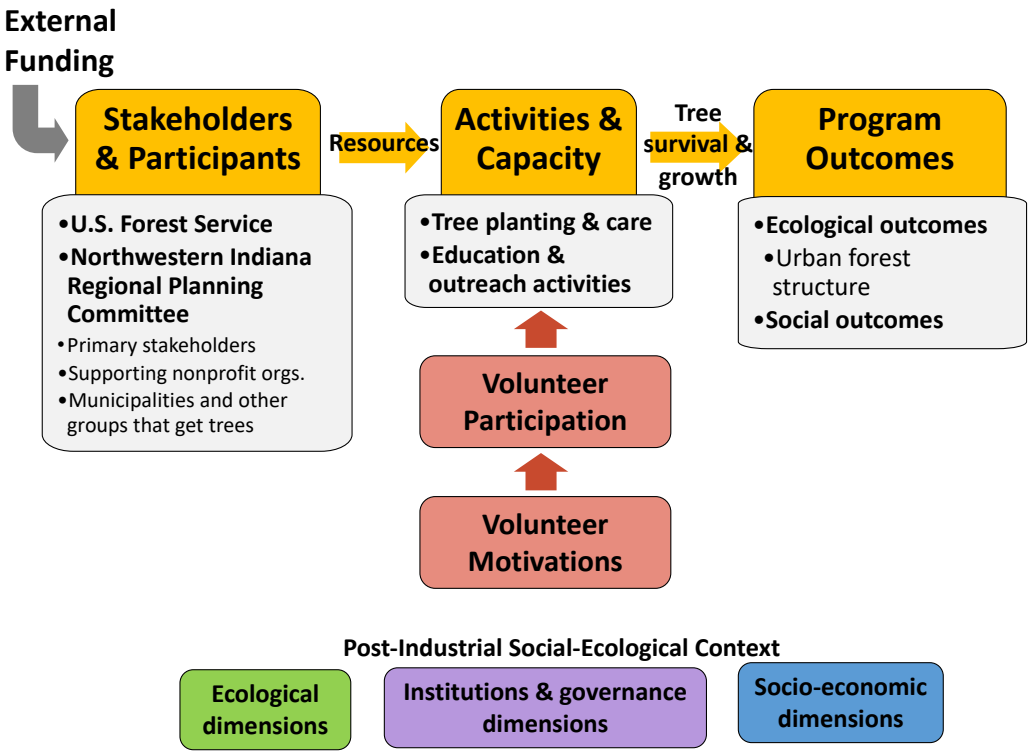

Figure 1. A conceptual framework for how CommuniTree transforms stakeholder resources into capacity for tree planting and care and subsequently into social and ecological outcomes, all in the context of the social-ecological system (cf., Vogt, 2020b) characteristics of post-industrial Northwest Indiana. Volunteer motivations (inclusive of environmental attitudes and personal efficacy) influences volunteer participation, in the center, and has the potential to play a role in helping transform contributed resources (e.g., funding to buy trees) into CommuniTree program outcomes (i.e., the ecological and social benefits of trees for communities). The social-ecological context of post-industrial Northwest Indiana communities acts as a milieu within which CommuniTree operates and in particular mediates the relationship between CommuniTree activities, capacity and outcomes.

We use data from a volunteer survey to answer questions 1 through 3 explicitly and then draw inferences about gaps and engagement (questions 4 and 5), framing our results in the volunteer process model.

METHODS

A 22-question (34 individual item), self-report survey was created to explore volunteer motivations for participation in CommuniTree tree planting events, volunteer perception of the benefits and drawbacks of urban trees and tree planting programs, and the outcomes they expect from the CommuniTree program. Additional questions were included to discern the environmental attitudes and personal efficacy of CommuniTree volunteers. For the purpose of our research, we draw upon Bandura's (1997) definition of self-efficacy and define personal efficacy as the belief in one's ability to accomplish the kinds of challenging goals that enact positive change on an individual, local, national, or global level.

The survey (Appendix A) was administered to CommuniTree volunteers online via email and social media posts, and in-person at CommuniTree planting events beginning in January of 2018 and ending in June of 2019. The first round of emails was distributed during January of 2018 via the CommuniTree volunteer mailing list (n=34) following the Dillman Method (Dillman, Smyth, and Christian, 2009). Because of extremely low number of responses (n=9; 26.5%) obtained via the online survey invitations, we switched to fully in-person administration of the survey during the spring 2018 planting season.

The research team attended tree planting events on two Friday and thirteen Saturday mornings during the spring and fall 2018 and spring 2019 planting seasons. Researchers attended and participated in the tree planting activities, took field notes, and administered surveys at every event. Each planting event began with a demonstration led by the Student Conservation Association tree crew on how to properly plant a tree. From there, volunteers were split into small groups and dispersed across the location (mostly parks, but also public schools, neighborhood streets, a golf course, and the private property of an industrial factory) to plant trees. Most events took place from 9 am to 12 pm, with about 25 to 50 native trees planted per event and an average attendance of 18 individuals. In total, we tallied 270 individuals (59% male and 41% female) across 15 tree planting events. During the conclusion of every event, all volunteers over the age of 18 were asked if they were willing to take a short survey. If they agreed to participate, paper copies of the survey were provided with a pen, were completed on-site, and returned to the research team.

All data from the in-person administration of the survey was entered and analyzed in Microsoft Excel. We used inductive (emergent) coding to find 13 major categories of motivations CommuniTree volunteers to attend the event, as determined by written responses to open-ended questions. See Table B.1 in Appendix B for example text coded to each category.

The benefits and drawbacks[1] of trees (questions 14 and 15, see survey in Appendix A) were qualitatively analyzed using a similar approach. Specifically, we used emergent coding (Saldaña, 2016) to group similar responses into codes (e.g., “make environments look better” was coded as “beautification”); then, we labeled and organized codes using language commonly used by urban forest researchers and practitioners to these emergent codes (e.g., the “beautification” code was placed under the “Aesthetics” category in a “Social benefits” theme). Benefits were organized into ecological and social urban forest ecosystem services (after Vogt, 2020a: Table 2, as modified from Roy, Byrne, and Pickering, 2012). Drawbacks were organized into private costs and public costs, the latter inclusive of “ecosystem disservices” (after Vogt, 2020a: Table 4, as modified from Roy, Byrne, and Pickering, 2012; and Vogt, 2020b: Table 1, as modified from Vogt, Hauer, and Fischer, 2015). See Table B.2. in Appendix B for example text coded to each category.

[1] Note that we chose to utilize the term “drawbacks” in the survey question as we believed it would be more inclusive than the term “costs,” which might yield only monetary or economic-related responses and would resonate with respondents more than the term “disservices,” which is not in common vernacular. See Roman et al. (2020) for a more detailed discussion of the language around the benefits and costs of urban trees.

RESULTS

A total of 114 surveys – 9 online and 105 in person – were completed by volunteers at tree planting events during fall 2017 through spring 2019 planting seasons. The most common survey respondent was male (58%), White/Caucasian (46%), full-time student (49%, including 11% who are also working part-time and 2% working full-time), between the ages of 18 and 24 (59%) (Table 3). Gender distribution of respondents matches that of all volunteers at events based on participant tallies (visual determination of volunteer gender) at events. We estimate a 39% response rate to our survey (105 in-person survey responses from 270 total individuals counted in attendance at plantings); however, this is a conservative estimate because volunteers were only surveyed once, and total participation count may include volunteers who attended multiple events. Before coming to a CommuniTree event, a little over half (58%) of survey respondents had previously planted a tree.

Because over half (54%) of surveyed respondents self-identified as either a part or full-time college student, we separate some of our key results by those that identified as a student versus those that did not, but we find mostly that students and non-students are not very different on motivations, environmental attitudes, and personal efficacy. See Figure 2 for the distribution of non-student versus student CommuniTree volunteer survey respondents by age class.

Motivations for Volunteering

When asked how they had found out about the event, the majority of respondents reported being told about the event from someone in their social and professional circles – whether a professor, friend, family member, or acquaintance, or through their employer. Through another organization was also a common response; 25% of respondents heard about the event through a university or community organization (Table 4).

Table 3. Self-reported demographics of CommuniTree volunteers who completed our survey.

Gender (n=113)	% respondents
Male	58%
Female	42%

Age Range (n=114)	% respondents
18 - 24	59%
25 - 34	22%
35 - 44	8%
45 - 54	7%
55 - 64	5%
65 +	0%

Race / Ethnicity (n=109)	% respondents
White/Caucasian	46%
Hispanic/Latino	23%
Black/African American	16%
Asian	9%
Mixed Race	5%
Other	1%

Employment Status[a] (n= 110)	% respondents
Full-time student	49%
Working full-time for pay	34%
Working part-time for pay	16%
Part-time student	5%
Unemployed or laid off	3%

[a] Percentages add up to more than 100% because respondents could select more than one category.

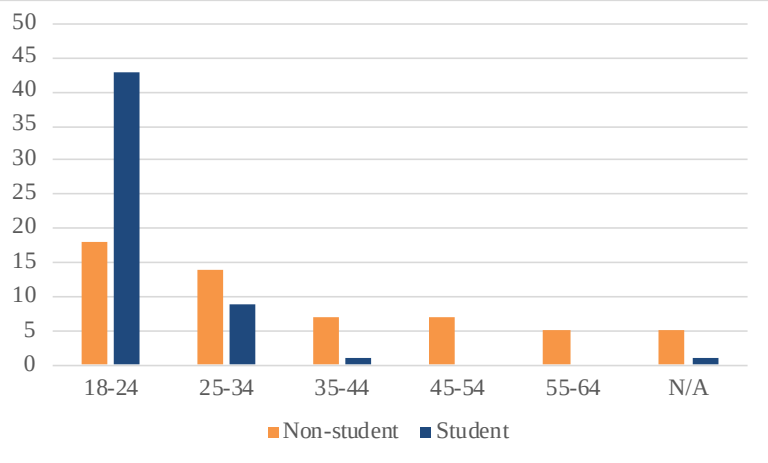

Figure 2. Frequency of CommuniTree volunteer survey respondents by age class and student status. *N/A* indicates respondents who did not provide their age.

Table 4. Survey respondents' self-reported reasons for attending a tree planting. Percentages add to more than 100% because respondents were able to provide multiple answers. *N/A* indicates respondents did not indicate student or non-student status.

	Student status			Total	
How did you hear about this event? (n=114)	**Non-student**	**Student**	**N/A**	**Count**	**%**
From a college/university professor	9	22		31	27%
Friend, family member, or acquaintance	9	17	1	27	24%
From my employer/company	20	4	1	25	22%
Community organization	12	9		21	18%
From a college/university organization	3	5		8	7%
Social media	4	3		7	6%
Other	3		2	5	4%
Mailing list or newsletter		4		4	4%
School newsletter		4		4	4%

Other-focused motivations, such as helping the community and wanting to help the environment were the most common reason for attending a CommuniTree event (Table 5). Self-focused motivators also played a major role in galvanizing volunteer attendance; 29% of all respondents listed school-related extra credit, or a work-related partnership as the motivation for attending a CommuniTree planting event. A requirement to complete community service (18%) was another important motivating factor listed by survey respondents. When comparing the motivations of surveyed volunteers by their student status, we found that students and non-students had similar rates of self- versus other-focused reasons for attending the tree planting.

Expected Outcomes of CommuniTree Program

When volunteers were asked to select three expected benefits from the CommuniTree program, respondents listed biodiversity and creating habitat for wildlife as the most likely outcome of tree

planting (63%). This was followed closely by beautification (61%), community development (56%), and increased green space (56%) (Table 6). While students were more likely to report biodiversity and habitat creation as an expected outcome of the CommuniTree program, non-students were more likely to list beautification as an expected outcome. Overall, however, respondents' status as a student or non-student had little influence over their expected benefits.

Table 5. Survey respondents' self-reported motivations for attending a tree planting. Volunteer motivations are themes generated from qualitative analysis of 154 open-ended text responses from 106 respondents. Percentages add to more than 100% because respondents were able to provide multiple answers. *N/A* indicates respondents did not indicate student or non-student status.

		Student status			Total	
Self-identified motivations	**Focus**	**Non-student**	**Student**	**N/A**	**Count**	**%**
Help the community	Other	12	11		23	22%
Help the environment	Other	7	10		17	16%
Community service	Both	10	6		16	15%
Appreciate nature	Self	8	5	1	14	13%
Social interaction	Self	9	5		14	13%
Fun experience	Self	4	8		12	11%
Organization partnership	Self	8	3	1	12	11%
Knowledge-based	Self	3	8		11	10%
University partnership	Self	2	9		11	10%
Extra credit	Self	4	6		10	9%
Employer partnership	Self	7		1	8	8%
General desire to help	Other	2	2		4	4%
Career-related	Self	2			2	2%

Table 6. Survey respondents' expected benefits from CommuniTree program. Percentages add to more than 100% because respondents were able to provide multiple answers. *N/A* indicates respondents did not indicate student or non-student status.

	Student status			Total	
Expected outcomes of CommuniTree (n= 114)	**Non-student**	**Student**	**N/A**	**Count**	**%**
Biodiversity and creating habitat for wildlife	32	40		72	63%
Beautification	38	30	1	69	61%
Community development	33	30	1	64	56%
Increased green space	32	30	2	64	56%
Lessening the impacts of climate change	25	23		48	42%
Youth programs	18	17	1	36	32%
Job creation	5	8	2	15	13%
Other	2			2	2%

Table 7. Survey respondents' self-reported benefits (n=100 respondents) and drawbacks (n=62 respondents) of trees and tree planting programs. Volunteers were requested to list up to 5 each of benefits and drawbacks. Percent refers to the percentage of all respondents (n=114) listing that type of benefit. **Bold** and *italicized* language for benefits and drawbacks after the categorization of ecosystem services and costs in Vogt (2020a, b), except for those denoted with an asterisk (*), which are new categories added here. See Table B.2 in Appendix B for examples of respondent text for each category.

BENEFITS	Count	%
Ecological benefits		
Air quality		
Provide oxygen	49	43%
Improve air quality	30	26%
"Helps you breathe"	3	3%
Biodiversity and conservation		
Habitat/food for wildlife	56	49%
Increase biodiversity	8	7%
Carbon related		
Carbon sequestration	22	19%
Mitigating climate change	6	5%
Microclimate		
Provide shade	21	18%
Regulates temperature	2	2%
Reduce urban heat island	1	1%
Stormwater		
Stormwater management	8	7%
Improves water quality	3	3%
*Misc. environmental quality**		
Help environment/ecosystem	28	25%
Prevent erosion/landslides	9	8%
Improve soil quality	7	6%
*Other ecological benefits**	1	1%
Social benefits		
Aesthetic benefits		
Beautification	62	54%
Urban quality of life		
Increase greenspace	19	17%
Dampens sound	2	2%
Community/social capital		
Community development/investment	7	6%
Positive community atmosphere	8	7%
*Provisioning of goods**		
Provide food	7	6%
Wood/paper source	6	5%
Human health		
Improves health/well-being	4	4%
Promote recreation/exercise	1	1%
Economic benefits		
Increase property values	1	1%
*Misc. social benefits**		
Tree climbing	4	4%
Other misc. social	7	6%

DRAWBACKS	Count	%
Private costs		
Direct costs		
Requires maintenance, upkeep, time	22	19%
Cost of planting/maintenance	15	13%
Requires volunteer labor	9	8%
Removal (costs of)	4	4%
Liability costs		
Hazardous, liability risk, damage potential	19	17%
Contributes to wildfire risk*	2	2%
Infrastructure interference costs		
Interfere with utility or sewer lines	6	5%
Root damage and uprooting	4	4%
Interference with sidewalks	2	2%
Public costs		
Opportunity costs		
Requires space	19	17%
Hinders view	2	2%
Ecosystem disservices		
Ecosystem integrity		
Possibility of non-native/ invasive species	10	9%
Pest/disease/insect risk*	5	4%
Debris/waste issues		
Animal/bird droppings	2	2%
Requires yard maintenance or leaf removal	11	10%
Other drawbacks*	3	3%

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Tree Benefits and Drawbacks

Survey respondents were asked to write in up to 5 benefits that they believe trees or tree planting initiatives provided (Table 7). Respondents listed more tree benefits than drawbacks, with 88% of respondents listing at least one benefit of trees compared to just 54% of respondents listing a drawback of trees. In total, respondents listed 254 ecological benefits and 132 social benefits of trees. Beautification was the most common individual benefit, listed by 54% of respondents, followed by air quality benefits – particularly the provision of oxygen (43%) and air quality improvements (26%). For drawbacks, the need for and costs of tree maintenance were the largest concerns of respondents, as well as liability risks from potential damage caused by trees.

Environmental Attitudes and Personal Efficacy

Sixty-eight percent of surveyed volunteers considered themselves to be environmentalists, 90% believe they have at least an "average" understanding of environmental issues, and over half reported having an above average understanding of environmental issues (Table 8). Non-students were just as likely as students to self-identify as environmentalists and reported similar levels of understanding about environmental issues.

In terms of environmental stewardship, the majority of respondents agreed that conservation, trees, and greenspace were important and that their actions can help solve environmental issues (Figure 3). The proportion of respondents who strongly agreed with statements in support of environmental stewardship and efficacy were similar regardless of whether or not they identified as a student (Figure 4).

Table 8. CommuniTree volunteer survey respondents' self-reported environmental attitudes and knowledge. *N/A* indicates respondents did not indicate student or non-student status.

Do you consider yourself an environmentalist? (n=114)

	Student status			Total	
	Non-student	**Student**	**N/A**	**Count**	**%**
Yes	38	37	3	78	68%
No	18	17	1	36	32%

How much would you say you know about environmental issues? (n=113)

	Student status			Total	
	Non-student	**Student**	**N/A**	**Total**	**%**
Far above average	13	8	2	23	20%
Somewhat above average	19	22		41	36%
Average	17	19	2	38	34%
Somewhat below average	5	4		9	8%
Far below average	1	1		2	2%

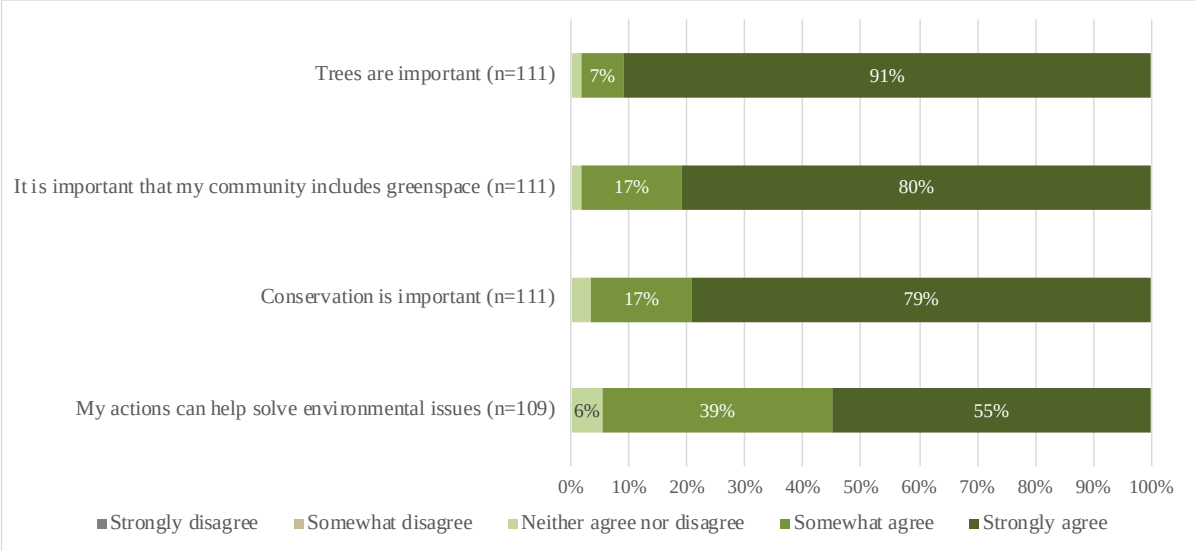

Figure 3. CommuniTree volunteers survey respondent attitudes towards environmental stewardship (top three bars) and environmental efficacy ("My actions can help…"). Note that no survey respondents disagreed with any of these statements.

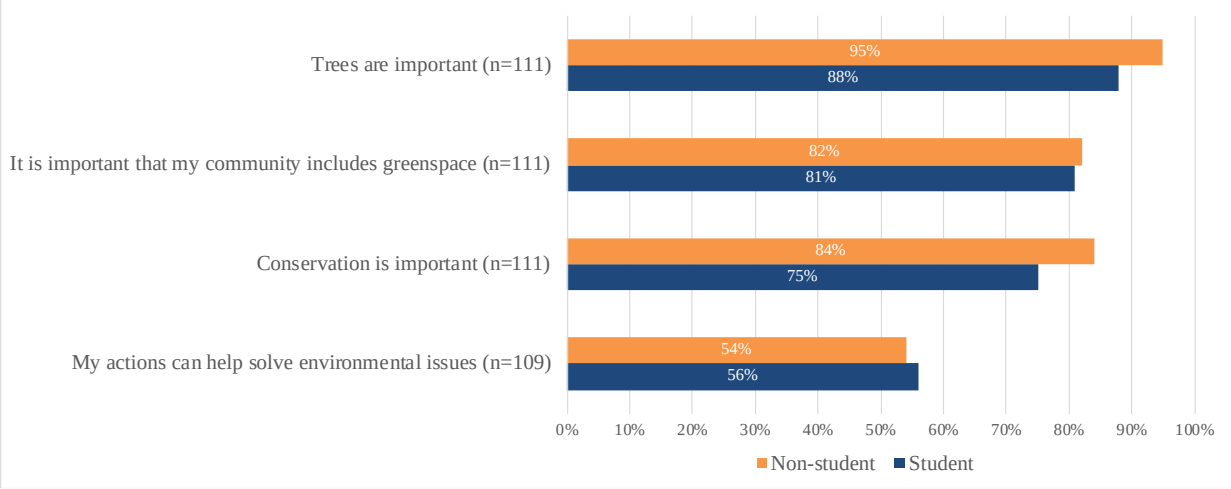

Figure 4. Percentage of respondents, separated by non-student versus student, who "Strongly agree" to statements supporting environmental stewardship and efficacy. Excludes respondents who did not indicate student status.

Survey respondents reported a belief that they have a stronger influence over local decisions and local environments than they do larger national and global scale decisions and environments (Figure 5). Survey respondents that self-identified as students were more likely to believe they have a lot of influence over local government decisions and environmental issues, while non-students were more likely to believe they have a lot of influence over national government decisions and global environmental issues (Figure 6).

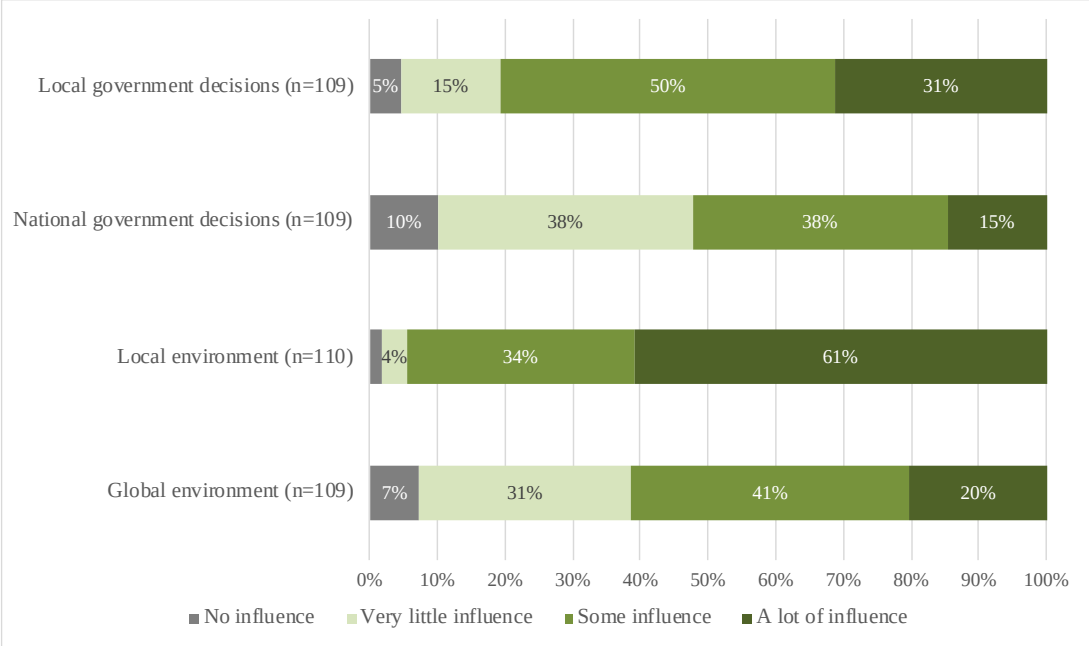

Figure 5. Personal efficacy of CommuniTree volunteer survey respondents, as measured by responses to a question about how much influence they believe they can have over the following spheres (labeled on the left side of the figure).

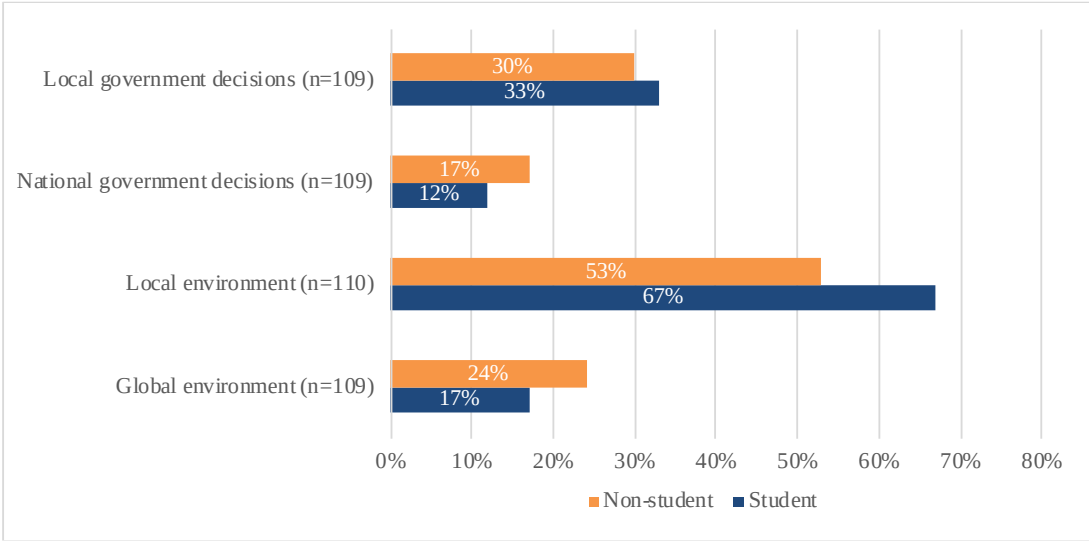

Figure 6. Percentage of survey respondents, separated by non-student versus student, who believe they have "A lot of influence" over their local and national government decisions and over their local and global environment. Excludes respondents who did not indicate student status.

DISCUSSION

Our survey found that CommuniTree volunteers responding to our survey are primarily made up of White, male, full-time students of college age (18-24), who came to the tree planting by way of their university professor or a friend or family member telling them about it. That CommuniTree volunteers skew toward those of college age is unsurprising. In the first couple years since its inception, CommuniTree and the Student Conservation Association have

purposely focused outreach efforts at local universities. Although some studies have observed that urban forest stewardship volunteers were slightly older (e.g., Westphal 1993; Moskell, Allred, and Ferenz, 2010), research from the Corporation for National Community Service (2018) has indicated that college students are more likely to volunteer, and being well educated was found to be an important characteristic of environmental stewardship volunteers in another study (Fisher, Svendsen, and Connolly, 2015). With respect to race, other studies have observed that volunteers are more likely to be White (Moskell, Allred, and Ferenz, 2010; Wilson, 2012; Fisher, Svendsen, and Connolly, 2015; Johnson et al. 2018). However, our finding of more male than female volunteers in our sample is unusual, since other studies of volunteering generally (Wilson, 2012) and of environmental stewardship specifically (Moskell, Allred, and Ferenz, 2010; Fisher, Svendsen, and Connolly, 2015; Johnson et al., 2018) find that volunteers disproportionately identify as female. However, some studies of environmental volunteering do not report on the race/ethnicity or gender identification of respondents (Grese et al., 2000; Ryan, Kaplan, and Grese, 2001; Asah and Blahna 2012, 2013), so it is unclear the extent to which our findings on gender identification may be unique to our study or might be reflected more broadly in environmental volunteering.

In the remainder of this section, we will discuss the motivations, knowledge, and efficacy, of surveyed CommuniTree volunteers, followed by a discussion of our results through the lens of the volunteer process model. Finally, we will discuss what these results mean in the socio-economic context of Northwest Indiana, and ways in which CommuniTree can more effectively meet the expectations of its volunteers and the needs of the communities it serves.

CommuniTree Volunteer Motivations, Attitudes, and Efficacy

Motivations to volunteer can come from internal factors such as the feeling of accomplishment, enjoyment or interest in the task itself, or from external factors such as rewards or recognition (Park and Word, 2012). Studies on nonprofit volunteers have found that most volunteers are driven by intrinsic factors (Cappellari and Turati, 2004), and thus are more likely to be interested in intrinsic rewards such as the experience or satisfaction of performing a task (Reinklou and Rosén, 2013). CommuniTree volunteers who completed our survey were more likely to describe other-focused, intrinsic desires to help the community as the main motivator for attending a tree planting event. These findings align with other studies that surveyed environmental stewardship volunteers and found that a desire to help the community was a significant motivating factor (Austin, 2002; Measham and Barnett, 2008; Moskell, Allred, and Ferenz, 2010; Asah and Blahna, 2012, 2013).

Whether an individual volunteers for intrinsic or extrinsic reasons will also have an effect on their overall experience. The act of volunteering itself requires access to various types of capital – where the likelihood and level of volunteering increases as human, social, and cultural capital increase (Forbes and Zampelli, 2014). Individuals with more social capital such as strong family and community connections have been found to be more likely to exhibit altruistic behavior in the form of volunteering (Duke et al., 2009; Theurer and Wister, 2010; Glanville, 2016). Research surrounding the intrinsic and extrinsic motivations for volunteering have found that while both types of motivations increase social capital through social recognition and

networking, intrinsic motivations lead to more meaningful connections and experiences (Antoni, 2009).

Social networks in particular played a vital role in galvanizing surveyed volunteers to attend CommuniTree tree planting events, with nearly all respondents reporting that someone in their immediate social circle (including work and school) recommended the event. A study that aimed to understand the influence of motivating factors on volunteer retention in urban conservation found that though an initial desire to help the environment was important in getting individuals to volunteer in the first place, meeting volunteers' personal, social, and community-building needs was the most important factor in continued engagement with organizations (Asah and Blahna, 2013). This is echoed by another study that found that volunteer motivations have interpersonal and intrapersonal dimensions that individuals seek to fulfill through participating in tree planting (Moskell, Allred, and Ferenz, 2010). Thus, leveraging the social capital that volunteers may already have into the volunteer experience is a critical method for increasing volunteer satisfaction and retention rate.

CommuniTree volunteers might also be motivated because of the benefits they see trees providing within their community. That 100 of 114 respondents listed benefits of trees, particularly ecological benefits, indicates a knowledge of the benefits that trees provide, and suggests that an interest in and/or knowledge of trees precedes volunteering to plant them. Compared to an older study that surveyed urban forestry stewards (Westphal, 1993), CommuniTree volunteers listed many more specific ecological benefits of trees. This perhaps reflects the growing awareness of the general public of ecological issues such as climate change, pollution, and other environmental challenges that have pervaded our public consciousness in the intervening decades.

A connected motivating factor for CommuniTree volunteers may be their preexisting attitudes with respect to environmental stewardship or their belief that their own individual actions can make a difference. Survey respondents showed a predisposition towards caring about the environment, with two-thirds of respondents considering themselves an environmentalist and half indicating that they possessed an above average understanding of environmental issues. Other studies have found that pro-environmental behaviors, attitudes, and value orientations predicts volunteering (McDougle, Greenspan, and Handy, 2011) and that identifying as an environmentalist predicts pro-environmental behavior, such as volunteering (Brick and Lai, 2018). Furthermore, having positive attitudes towards environmental stewardship generally and/or trees specifically has been found to be a motivating factor for volunteering (Austin 2002, Measham, and Barnett 2008; Dresner, et al., 2013).

We found that CommuniTree volunteers exhibited strong personal efficacy, with half or more of respondents stating that they felt they could have at least some influence over the environment in their neighborhood, the global environment, local government decisions, and national government decisions. Looking at volunteering generally, these findings match other studies that found volunteers to be more likely to report higher self-efficacy (Brown, Hoye, and Nicholson, 2012). In a study of environmental stewards in the Portland, Oregon, USA, frequent volunteers were more likely to feel attached to their local environment, enjoy being a part of

community efforts, and believe that their efforts could help solve environmental problems (Dresner, et al., 2013).

Although the majority of CommuniTree volunteers were either young adults or college students, we found that this had little influence over their initial motivations, understanding of environmental issues, pro-environmental behavior, or sense of personal efficacy. Our study therefore provides evidence that environmental volunteers, and in this case urban forestry volunteers, are more likely to display pro-environmental behavior, higher understanding of environmental issues, and higher rates of personal efficacy.

CommuniTree and the Volunteer Process Model

The goal of this study was to aid CommuniTree in more effectively meeting the needs of the communities it serves by better understanding who volunteers and what motivates these individuals to participate in local tree planting events. Using Snyder and Omoto's (2008)

Table 9. Survey results from CommuniTree volunteers (n=114) understood through the lens of the Snyder and Omoto's (2008) volunteer process model.

Levels of Analysis	**Stages of the Volunteer Process**		
	Antecedents	**Experiences**	**Consequences**
Individual	Motivated most commonly by other-focused desires to help the community and the environment, but also motivated by self-focused, extrinsic factors	High satisfaction (98% of surveyed volunteers would volunteer with CommuniTree again)	*What knowledge have CT volunteers gained? Has their attitudes or self-efficacy changed after participating in a tree planting?*
Interpersonal/ Social Group	Majority of young adults and/or students. Regardless of age or employment status, volunteers reported an average or above-average understanding of environmental issues	*For school and work groups, teambuilding exercises can strengthen these interpersonal groups*	*How have interpersonal groups (i.e. school and work groups, neighbors) been affected by attending CT events?*
Agency/ Organization	Encouraged to volunteer by a university professor, a friend or family member, or from their employer	Tree crew leaders help facilitate linkage between volunteers' expected outcomes and their experiences at planting events	*What is CT's volunteer retention?*
Societal/ Cultural Context	Majority self-identified as environmentalists, with a strong sense of personal efficacy, and a positive attitude towards environmental stewardship	*CT volunteers play a vital role in the community by providing a philanthropic service*	*How do shared values and a sense of reciprocity positively affect communities where tree plantings occur?*

** Inferences or recommendations for further research are made in italics where further research is needed. The consequences stage in particular represents largely as yet unexplored avenues for research, since the outcomes of CommuniTree are as of yet unknown.*

volunteer process model, we are able to situate the results of this study into practical form. Table 9 depicts our results through the lens of the volunteer process, where antecedents, experiences, and consequences are divided into four levels of analysis at the individual, interpersonal, organizational, and societal levels.

Most of our data is at the antecedents stage, where we find that individuals were most commonly motivated by intrinsic, other-focused desires to help the community and the environment, but were also very likely to cite self-motivating extrinsic factors as well. In a review of the literature surrounding best practices for motivating and retaining volunteers, the authors found that individuals seek different rewards or experiences based on the original intrinsic or extrinsic factors that motivated them (Reinklou and Rosén, 2013). Social networking played a very important role in the antecedents stage, as volunteers reported being encouraged by someone in their immediate social circle as the number one reason for participating in a tree planting event.

In the experiences stage, we look more closely at the event itself and begin to make connections between what may be rewarding to volunteers based on their initial motivations found in the antecedents stage. Matching the motivations that drew individuals to volunteer with the activities and the experience of volunteering has been shown to yield more satisfied volunteers who are less likely to experience burn-out (Snyder and Omoto, 2008). The quality of these experiences is influenced by the perception of their volunteer work, of the organization itself, and of other people's reactions to their work. Furthermore, volunteers are more likely to be satisfied if they feel that their experience has met their expectations. For our surveyed volunteers, satisfaction rate was high, and nearly all volunteers reported that they would attend a future CommuniTree event.

Looking at our survey data through the lens of the volunteer process model, we find that the CommuniTree program accomplishes a high satisfaction rate likely by meeting the diverse needs of their volunteers in terms of the participation (experience) and outcomes (consequences) of volunteering (Figure 1). Student Conservation Association tree crew leaders, who help facilitate CommuniTree planting events, ensure that these needs and outcomes are met by creating a social and educational environment that is inclusive to all volunteers, regardless of their prior experience level or what motivated them to attend. By beginning each tree planting with introductions and icebreakers, new and returning volunteers are incentivized to group up, breaks are encouraged, snacks are provided, and a group photo is taken at the end. In a study that examined volunteer retention in urban conservation, the authors recommended social activities such as games, food, and drinks as a successful method of coordinating volunteer events (Asah and Blahnah, 2012). This kind of comradery appeals to individuals who volunteer for social reasons, whether to bond with individuals within their own social groups or to meet new people from outside their immediate social circle. Every CommuniTree event also begins with a tree planting demonstration, where tree crew leaders give clear instructions on how to properly plant a tree. These demonstrations include intricacies on appropriate tool use, locating the root flare, removing any girdling roots, and information on why it's important to plant a diversity of native tree species. For this reason, volunteers that were motivated to attend the event as a way to gain knowledge or learn a practical skill would have their needs and expectations met. The

forethought and attention to detail invested by the CommuniTree program and tree crew leaders fosters cultural identity within the group itself and might help build a sense of collective efficacy around positive change. Collective efficacy is the ability that a community has to cultivate trust, generate shared values, make use of available resources, and mobilize towards collective action (Sampson, Raudenbush, and Earls, 1997).

At the consequences stage, we are able to make statements about the potential impact of volunteering across several levels of analysis; however, we are unable to make causal claims without a quasi-experimental design of some sort (where, for example, we might compare CommuniTree volunteer outcomes with the outcomes of volunteering for another cause or organization, or with individuals who have not volunteered at all). And while we have not directly measured the knowledge or skills that CommuniTree volunteers gained from these events, we can make some assumptions based on the data and literature available to us. For instance, university students that volunteer together have been found to further strengthen their social capital (Cheung and Liu, 2017), and university students that volunteer in general describe an overall feeling of being more committed, competent, and connected as an outcome (MacNeela and Gannon, 2013). For work groups, such as the partnerships CommuniTree has with local businesses, employees that volunteer together have been found to be more engaged and report higher levels of autonomy and support from co-workers and supervisors (Boštjančič, Antolović, and Erčulj, 2018). Moreover, the kinds of experiences that volunteering provides positively reinforces interpersonal feelings of self-efficacy (Bandura, 1997; Brown, Hoye, and Nicholson, 2012). Though we did not ask CommuniTree volunteers directly how they felt on an emotional level before and after participating in tree planting, the literature suggests that these individuals are likely to have benefitted within their intra and interpersonal relationships. In their own work, Snyder and Omoto (2008) found that personal development, or esteem enhancement through volunteering, predicted longer duration of volunteer service and that involvement in volunteerism strengthens and builds connections to community.

When CommuniTree volunteers were asked what their desired outcomes or ‘consequences’ of the program were, they listed improved biodiversity and community development – that is, both ecological *and* social outcomes. Attracting and retaining volunteers remains one of the biggest and most time-consuming tasks for nonprofits (Phillips and Phillips, 2010). For CommuniTree, volunteers are motivated by a desire to help the community and the environment and are also already quite knowledgeable about the benefits of trees. Thus, to engage with and retain volunteers, we suggest that CommuniTree further emphasize the positive impacts that trees and tree planting programs have on the community (through their social benefits) and on the environment (through their ecological benefits).

There are several avenues of future research suggested by an examination of our results in the framing of the volunteer process model. First, measuring the observed consequences of community tree planting via volunteers – on the volunteers, their interpersonal relationships, the organizations involved, and the societal context – would be useful to fleshing out the volunteer process model theory as it applies to environmental volunteering and urban forestry volunteering specifically. Additionally, the model as applied here largely leaves out the reciprocal relationship of the influence of the context within which volunteering occurs on the volunteer process itself. Examining the various dimensions of the macro social-ecological context of volunteer urban tree

stewardship for a program like CommuniTree (e.g. the ecological, institutional, and socio-economic dimensions as shown in Figure 1) would provide valuable insight into the conditions under which specific aspects of volunteer antecedents, experience, and consequences are most salient. Future phases of CommuniTree research will investigate this social-ecological context. Finally, a research design that explicitly investigates the differential antecedent, experiential, and consequence-related factors for different groups of volunteers – e.g., students and young people, volunteers of particular racial or ethnic identities – would help volunteerism research and volunteer organizations better tailor volunteer opportunities to these groups.

Implications of CommuniTree in the Context of Northwest Indiana

The perceptions that people have of their individual and collective capacities can influence their willingness and ability to tackle difficult problems within their communities (Bandura, 1989). For surveyed CommuniTree volunteers, we found that personal efficacy was high. That being said, based on the socio-demographic data provided by this study, we found gaps between who participates in CommuniTree events and who represents the local community. Looking at ethnicity and education level of surveyed CommuniTree volunteers, for example, we found a high percentage of White, university students – a demographic that doesn't wholly represent the areas where these tree plantings take place (Vogt and Abood, 2020). We suspect that this gap may be common for other tree planting programs as well.

To address the gaps in who volunteers at CommuniTree events, we suggest that the program increase their outreach to more racially and ethnically diverse community members and organizations beyond universities and industrial businesses.[2] For example, CommuniTree could act as a powerful facilitator by connecting its existing volunteers, who already have a strong desire to help the community, with the individuals and groups who make up that community. For under-represented groups in particular, leveraging the relationships they already have within their own community has been found to be a successful method of outreach (Alvarez et al., 2006). By including more stakeholders from within the community where tree planting occurs, and by maintaining a consistent and engaged presence in the community itself, CommuniTree is more likely to sustain its efforts over time. In a study on community participation in neighborhood organizations and their relationship to self and collective efficacy, Ohmer (2007) found that the more neighborhood volunteers participated in decision making, the greater their sense of community, leaderships skills, and ability to influence government and neighborhood policy. Volunteer participation that reaches a broader swath of the community will be an important vehicle for CommuniTree in meeting its goal of alleviating the social and ecological issues these communities face through increasing their personal and collective efficacy in the process.

Between the years 2017 and 2019, CommuniTree hosted 50 workdays, engaged an estimated 2,150 volunteers, and planted more than 3,000 trees (Hart and Gylys, 2020). But CommuniTree is much more than just putting trees in the ground. CommuniTree also orchestrates follow-up watering strategies that ensure new trees are cared for after planting. Through the tree crew as well as the volunteer opportunities, CommuniTree offers the

[2] Personal communication between the third author and CommuniTree partner organizations has indicated that these outreach efforts are in fact already underway.

introduction of career pathways that are vital for young adults interested in exploring the field of environmental science and urban forestry (Anderson and Buskin, 2019; O'Herrin et al., 2020). Since the program's inception, several communities within the region have completed street and park inventories and have had staff become certified arborists (Hart and Gylys, 2020). The act of planting and caring for trees within these communities heightens urban forestry awareness and creates tangible opportunities for community members, organizers, and municipal employees to receive training and experience with the trees in their neighborhoods.

CONCLUSION

This study found that surveyed volunteers at tree planting events report high rates of pro-environmental behavior, a high level of understanding of environmental issues, and high personal efficacy. Furthermore, this study highlights the success of a collaborative, multi-organizational tree planting partnership in engaging university students and local businesses by matching their motivations to volunteer with their expectations and desired outcomes. Still, there remains room for growth. The demographic results from our surveys found that those who participate in tree planting events do not fully represent the targeted communities. While the partnerships that CommuniTree has fostered have been successful at getting volunteers to show up and participate, they represent a more 'captive audience' that might ultimately be motivated for extrinsic reasons, such as university extra credit or work-related obligations. Indeed, increasing outreach to include under-represented groups could have for the communities and residents that neighborhood tree planting programs aim to serve.

Appendices start on next page.

Appendix A: Volunteer Survey

Survey. Page 1 of 3.

CommuniTree Volunteer Survey
Conducted by the Lab for Urban Forestry in the Anthropocene
DePaul University

DEPAUL UNIVERSITY

Fill in the bubble or check the box next to the response that corresponds to your answer.

1. Are you volunteering, or have you volunteered in the past, with CommuniTree?
- Yes, I am a current volunteer
- Yes, I have volunteered in the past
- No

2. How did you hear about the opportunity to volunteer with CommuniTree?
- Friend, family member, or acquaintance
- News article
- Mailing list or newsletter
- Community organization
- School newsletter
- Social Media
- From a college/university professor
- From my employer/company
- Other: _____

3. Is this your first experience with CommuniTree?
- Yes
- No

4. Why did you decide to volunteer with CommuniTree?

5. What activities have you participated in with CommuniTree? *Check all that apply.*
- Tree planting
- Mulching
- Pruning
- Tree stewardship
- Other: _____

6. How much would you say you know about environmental issues and problems?
- Far above average
- Somewhat above average
- Average
- Somewhat below average
- Far below average

7. Would you come to another CommuniTree event in the future?
- Yes
- No

8. What benefits do you expect from the CommuniTree program? *Select your top 3.*
- ☐ Beautification
- ☐ Biodiversity and creating habitat for wildlife
- ☐ Job creation
- ☐ Youth programs
- ☐ Lessening the impacts of climate change
- ☐ Community development
- ☐ Increased green space
- ☐ Other: _____

9. Before volunteering with CommuniTree, had you ever planted a tree?
- Yes
- No

10. Do you consider yourself to be an environmentalist?
- Yes
- No

Page 1 of 3

Survey. Page 2 of 3.

11. For the following list of statements about the causes for environmental problems, please rate the extent to which you agree or disagree:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Don't know
Factories and manufacturing plants cause pollution when making the products we use.	❍	❍	❍	❍	❍	❍
Products that businesses use cause environmental problems – pollution, disposal problems, etc.	❍	❍	❍	❍	❍	❍
There are many technical advancements that seem like good ideas at the time but cause long-term problems that are not known for 10 or 20 years.	❍	❍	❍	❍	❍	❍
Consumers are more interested in the convenience many products provide than in the effect they have on the environment.	❍	❍	❍	❍	❍	❍
Countries don't cooperate on solving problems that require international cooperation.	❍	❍	❍	❍	❍	❍
Consumers aren't willing to pay more for products that are environmentally sound.	❍	❍	❍	❍	❍	❍
Companies do not develop and make available environmentally sound products.	❍	❍	❍	❍	❍	❍

12. How much influence do you think someone like you can have over the following?

	A lot of influence	Some influence	Very little influence	No influence
National government decisions	❍	❍	❍	❍
Local government decisions	❍	❍	❍	❍
The global environment	❍	❍	❍	❍
The environment in my neighborhood	❍	❍	❍	❍

13. Please rate the extent to which you agree or disagree with the following statements.

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
My actions can help to solve environmental issues and problems.	❍	❍	❍	❍	❍
It is important to me that my community includes green space.	❍	❍	❍	❍	❍
Trees are important to my local environment.	❍	❍	❍	❍	❍
Conservation is important to me.	❍	❍	❍	❍	❍

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Survey. Page 3 of 3.

14. Please list up to 5 benefits of trees you can think of and put an asterisk (*) before the one that is most important.

15. Please list up to 5 costs/drawbacks of trees you can think of and put an asterisk (*) before the one that is most important.

16. Which of these best describes your gender?

- ❍ Male
- ❍ Female
- ❍ Other: _____

17. In what year were you born?

18. What race(s)/ethnicity(ies) do you consider yourself to be? *Check all that apply.*

- ☐ Black/African American
- ☐ White Caucasian
- ☐ Hispanic
- ☐ Asian
- ☐ Alaskan
- ☐ Native/Native American
- ☐ Other: _____

19. What is your current employment status?

- ❍ Working full time for pay
- ❍ Working part time for pay
- ❍ Unemployed or laid off
- ❍ Full-time student
- ❍ Part-time student
- ❍ Retired
- ❍ Not employed & not seeking employment
- ❍ Disabled

20. What other activities would you like to see CommuniTree do?

- ❍ Education programming
- ❍ Job training programs
- ❍ Neighborhood tree pruning & watering/stewardship
- ❍ Other: *Please describe below*

21. Where else would you like to see CommuniTree plant trees?

22. What other organizations might CommuniTree work with?

Thank you for taking our survey!

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Appendix B: Qualitative Coding Tables

Table B.1. Responses from survey respondents when asked, "Why did you attend a CommuniTree event?" Open-ended responses were categorized into 13 major themes determined to be either self-focused or other-focused based on language within the volunteer process model (Snyder and Omoto, 2008).

Motivation	Response examples	Focus	Reasoning
Appreciate nature	"I like/love nature", "I like planting trees"	Self	Meet personal or specific needs / esteem enhancement
Career-related	"I am here to for job-related reasons" (not related to employer or university partnerships)	Self	Bolster career / networking
Community service	"I like to volunteer", "I needed volunteer hours"	-	*
Extra credit	"I was offered extra credit for attending"	Self	Meet personal or specific needs
Fun experience	"It sounded fun"	Self	Meet personal or specific needs / esteem enhancement
General desire to help	"I want to help out"	Other	Values and community concern
Help the community	"I want to help the community", "To help the City of Gary"	Other	Values and community concern
Help the environment	"I want to help the environment", "To give back to the trees"	Other	Values and community concern
Knowledge-based	"I want to learn to plant trees", "I wanted to gain insight on the community"	Self	Personal development, gain understanding
Social interaction	"I wanted to meet new people", "My family, friend, club recommended I attend"	Self	Social concerns / networking
Employer partnership	"My employer partnered with CT"	Self	Social concerns / networking
Organization partnership	"My organization partnered with CT"	Self	Social concerns / networking
University partnership	"My professor told us about CT", "My class had an assignment"	Self	Social concerns / networking

* Community service can be either self-focused or other-focused, depending on whether it is voluntary or in-voluntary (i.e. deciding to volunteer vs. being required to volunteer)

Table B.2. Response from survey respondents when asked to name up to five benefits and five drawbacks of trees. Open-ended responses were coded into categories with similar responses (plain text in first column of table below), which were then **Bold** and *italicized* language for benefits and drawbacks after the categorization of ecosystem services in Vogt (2020a, as modified from Roy, Byrne, and Pickering 2012) and costs (public and private) in Vogt (2020b, as modified from Roy, Byrne, and Pickering 2012, and Vogt, Hauer, and Fischer 2015), except for those denoted with an asterisk (*), which are new categories added here.

Category	Response example(s)
BENEFITS	
Ecological benefits	
Air quality	
Provide oxygen	"provide oxygen", "oxygen", "produce oxygen"
Improve air quality	"purify air", "better air quality", "clean air"
"Helps you breathe"	"helps you breathe", "breathing"
Biodiversity and conservation	
Habitat/food for wildlife	"animal living space", "give hospitable environment to many species", "habitat", "bird space"
Increase biodiversity	"biodiversity", "more diverse ecosystem"
Carbon related	
Carbon sequestration	"decrease co2", "breathing in Co2", "addresses pollution by sequestering co2", "carbon pollution reduction"
Mitigating climate change	"lessening climate change", "impact on global warming"
Microclimate	
Provide shade	"shade"
Regulates temperature	"cooling canopy"
Reduce urban heat island effect	"lessens urban heat island"
Stormwater	
Stormwater management	"flooding", "flood mitigation", "water retention"
Improves water quality	"water quality"
*Misc. environmental quality**	
Help the environment/ ecosystem	"help the environment", "vital to ecosystems", "good for environment", "native trees restore the ecosystem"
Prevent erosion/ landslides	"prevent erosion/landslides", "preventing soil erosion", "hold soil"
Improve soil quality	"enriching soil", "provide fertilization to areas with decomposition", "soil help"
*Other ecological benefits**	
Social benefits	
Aesthetic benefits	
Beautification	"make environments look better", "beautification", "nice landscape", "beautify communities", "pretty"
Urban quality of life	
Increase greenspace	"more greenspace", "greenspace"
Dampens sound	"sound damper"
Community/social capital	
Community development/investment	"potential reinvestment", "improves community relations", "improve parks", "community building"
Positive community atmosphere	"positive atmosphere within community", "make a place more welcoming"

Category	Response example(s)
*Provisioning of goods**	
Provide food	"could provide food", "fruit"
Wood/paper source	"timber", "wood source", "paper products", "construction"
Human health	
Improves mental health/well-being	"inc peoples well being", "mental health"
Promote recreation/exercise	"healthy exercise"
Economic benefits	
Increase property values	"inc property values"
*Misc. social benefits**	
Tree climbing	"something to climb", "climbing"
Other misc. social	"provide a safe environment", "gets more people directly involved in environmental conservation", "treehouse", "education", "Youth program"
DRAWBACKS	
Private costs	
Direct costs	
Requires maintenance, upkeep, time	"upkeep (watering)", "maintenance", "not maintained/trees die", "pruning", "must water regularly", "hard to manage"
Cost of planting/maintenance	"lack of maintenance/funding", "cost", "costly to stay green", "cost money"
Requires volunteer labor	"getting people involved", "volunteer support", "takes people in the community to help", "planting requires volunteers i.e. people willing to commit their time"
Removal (costs of)	"removal when dead", "costly to remove big trees", "hard to pull them up when they die"
Liability costs	
Hazardous, liability risk, damage potential	"falling on house/car", "accidental tree damage (property)", "falling hazard", "hazardous in storms (falling branches)"
Contributes to wildfire risk*	"contribute to wildfire", "forest fires"
Infrastructure interference costs	
Interfere with utility or sewer lines	"impediments on power lines", "debris from trees blocking and clogging drainage", "grow into pipeline"
Root damage and uprooting	"root damage", "roots", "up roots"
Interference with sidewalks	"sidewalks, etc.", "sidewalk damage"
Public costs	
Opportunity costs	
Requires space	"space might not accommodate", "take up space", "overcrowding", "nature offers less space for companies", "tall"
Hinders view	"blocking views", "block views"
Ecosystem disservices	
Ecosystem integrity	
Possibility of non-native/ invasive species	"may not increase biodiversity", "invasive", "non-native trees harm the ecosystem"
Pest/disease/insect risk*	"bugs", "disease", "inoculation", "ash bugs"
Debris/waste issues	
Animal/bird droppings	"animal waste", "parking under a tree and getting bird poop on the car"

Category	Response example(s)
Requires yard maintenance or leaf removal	"leaf removal", "leaf disposal", "hard maintenance"
Other drawbacks*	

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