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Amenities, disamenities, and decision-making in the residential forest: An application of the means-end chain theory to roadside trees

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ABSTRACT

The residential forest provides many amenities to communities, including aesthetics, air quality improvement, and higher property values. However, the residential forest may also contribute human-perceived problems or disamenities including allergens, leaf debris, infrastructure damage, and maintenance costs. Vegetation management by utility companies along power lines is one process that shapes the residential forest. Property owners' decisions to consent or object to utility vegetation management may be influenced by perceived tree amenities and disamenities. To explore this decision-making process, we conducted 32 one-on-one semi-structured qualitative interviews with resident-homeowners who consented or objected to a utility company tree removal on their property between 2014 and 2017. The study area included several towns in eastern Connecticut, USA, representing urban, suburban, and exurban residential areas. We applied the means-end chain theory as a theoretical framework, and used laddering interviews to explore the tree amenities, disamenities, and values associated with trees. Attractiveness, shade, and privacy were the most frequently identified amenities of trees; risk to power lines, trees being dead or diseased, and risk to people were the most frequently identified disamenities. Amenities and disamenities were connected to such values as happiness and enjoyment, closeness to nature, comfort, pride in one's home, aesthetics, life, avoiding harm to others, and time or money for other priorities. Participants who objected to utility tree removals primarily identified tree amenities as reasons to retain the trees, whereas participants who allowed tree removals primarily identified disamenities as reasons for their decision. The most common reason for objecting to removal was uncertainty about the need for removal. Participants had diverse perceptions of how tree amenities and disamenities affected their potential consent to utility vegetation management, illustrating that the priorities and concerns of individual residents are important considerations for forest managers and arborists engaged in vegetation management on private property.

1. Introduction

Residential landscapes provide ecosystem services for communities and are important sites for human-environment interactions (Kuo, 2003; Cook et al., 2012). Trees and woods where people live (the residential forest; Kendra and Hull, 2005) have been associated with amenities such as air quality improvement (Nowak and Dwyer, 2007), improved public health (Dwyer et al., 1992), and increased property values (Donovan and Butry, 2010). More recently, attention also has been given to potential disamenities, the structures and functions of ecosystems and related disservices that people perceive as negative to their well-being (Lyytimäki and Sipilä, 2009) that trees may contribute to communities (Kitchen, 2013; Cariñanos et al., 2017; Guo et al., 2019; Roman et al., 2020). For trees in the residential forest, examples of disamenities include pollen allergens, damage to infrastructure (such as to utility power lines), water demand for irrigation, and maintenance costs

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(Lyytimäki and Sipilä, 2009; Escobedo et al., 2011; Pincetl et al., 2012; Kirkpatrick et al., 2013; Kitchen, 2013; Dobbs et al., 2014; Delshammar et al., 2015; Lyytimäki, 2015; Conway and Yip, 2016; Cariñanos et al., 2017; Guo et al., 2019; Roman et al., 2020).

People influence residential forests as they make changes to vegetation on their property, including planting, pruning, and removing trees (Pickett et al., 1997; Cook et al., 2012). Such decisions are driven by many factors, including residents' landscaping preferences and attitudes toward lawn management practices (Spinti et al., 2004; Hirsch and Baxter, 2009; Larson et al., 2009), property attributes (e.g., yard size and housing age; Cook et al., 2012), socioeconomic characteristics (Belaire et al., 2016; Minor et al., 2016), neighborhood norms and appearance of neighbors' yards (Nielson and Smith, 2005; Nassauer et al., 2009; Belaire et al., 2016), and governance constraints (e.g., homeowner associations or local government regulations; Martin et al., 2003; Pike et al., 2021). While previous research on the residential forest has focused largely on how the amenities trees provide can affect residents' decisions to plant or maintain trees (e.g., Summit and McPherson, 1998; Jones et al., 2012; Kirkpatrick et al., 2013; Conway and Yip, 2016; Conway, 2016), disamenities also may play a role in residents' perceptions of trees and decisions about trees on their properties (Kirkpatrick et al., 2013; Conway and Yip, 2016; Conway, 2016; Cariñanos et al., 2017; Guo et al., 2019; Teixiera et al., 2019; Roman et al., 2020). For example, Kirkpatrick et al. (2013) found that tree removal decisions were commonly driven by disease or advanced age of the tree, root damage to infrastructure, and fallen limbs or trees. Similarly, Conway (2016) found that concern about tree health was also the most common reason for removing trees or planning to do so soon, followed by concerns about property damage, as related to both actual damage and perceived risk.

One process shaping the residential forest is vegetation management by utility companies along roadsides and power lines, which is driven by the need to mitigate potential storm damage to trees and power lines to maintain a reliable power supply (Kempter, 2004; Eversource, 2019). This management is mediated by property owners, who may consent or object to a utility company's request to prune or remove trees. Utility tree management is conducted at no direct cost to the property owner, which allows homeowners the autonomy to make tree management decisions without financial considerations that might otherwise constrain decision-making about tree removals (Perkins, 2011). Elsewhere in the literature, financial constraints and the high cost of tree removals have been found to be among the most common reasons for homeowners to retain unwanted trees (Conway, 2016; Guo et al., 2019). Survey data and landscape-level spatial analysis found that Connecticut (USA) residents understood the tradeoffs between protecting trees and maintaining power and had generally favorable attitudes toward utility vegetation management (Hale and Morzillo, 2020; DiFalco and Morzillo, 2021). Here we used the context of resident decision-making for utility vegetation management to explore how tradeoffs between amenities and disamenities of trees might contribute to tree retention or removal decisions.

To understand how residents make decisions about utility vegetation management, we addressed three questions: (1) What amenities and disamenities of roadside trees do homeowners identify as important?; (2) What relationships exist between the amenities and disamenities of trees and homeowners' underlying values?; and, (3) How do amenities, disamenities, and values influence homeowner decision-making about tree removals? To explore these topics, we interviewed homeowners in eastern Connecticut who were approached by their utility company about the removal of a power line-adjacent tree on their property.

2. Background and theoretical framework

2.1. Amenities and disamenities of trees

The amenities that trees provide in the residential forest have been well-studied. In addition to extensive literature on the ecosystem services provided by trees (e.g., Nowak et al., 2006; Escobedo et al., 2011; Roy et al., 2012; Salmond et al., 2016), there is interest in the amenities that residents consider to be important. Past research suggests that residents identify shade as one of the most important amenities provided by the residential forest (Summit and McPherson, 1998; Lohr et al., 2004; Camacho-Cervantes et al., 2014; Conway and Yip, 2016). Other amenities that residents have named as important include attractiveness or aesthetics (Smardon, 1988; Summit and McPherson, 1998; Camacho-Cervantes et al., 2014; Conway and Yip, 2016), calm feelings (Lohr et al., 2004), improved air quality (Lohr et al., 2004), oxygen provision (Camacho-Cervantes et al., 2014; Conway and Yip, 2016), attraction of wildlife (Lohr et al., 2004; Kirkpatrick et al., 2013), and environmental quality improvement (Camacho-Cervantes et al., 2014). Previous studies also have explored resident valuation of amenities provided by urban forests. For example, Soto et al. (2018) found that an increase in property value was the most important service provided by trees both on and near the respondent's property, followed by tree condition and tree shade. In an assessment of monetary values associated with preferences for urban forests, Hong et al. (2018) observed a preference of broadleaved versus coniferous trees, and willingness to pay slightly more to change coniferous forests to broadleaved forests, although results varied among demographic groups.

Previous work also has explored the disamenities that residents perceive trees to contribute to the residential landscape, including trees on the owners' property (e.g., Conway and Yip, 2016) and street trees or off-property trees (e.g., Camacho-Cervantes et al., 2014). Conway and Yip (2016) assessed Toronto residents' perceptions of tree disamenities following a major ice storm, finding that root damage to infrastructure, harm from falling branches, problems with utility wires, and high costs of maintenance and removal were among the most frequently identified risks. Camacho-Cervantes et al. (2014) surveyed residents of the city of Morelia, Mexico about perceived benefits and risks of trees and preferences for trees in the city (e.g., location, size, quantity). Although most respondents (78 %) indicated that trees do not cause any damages, those damages that were identified by respondents included accidents, infrastructure damage, waste from dropped leaves, and electric service damage (Camacho-Cervantes et al., 2014). Threats to infrastructure (e.g., sidewalks, utilities) have been commonly identified as tree disamenities in the residential forest (Summit and McPherson, 1998; Lohr et al., 2004; Jones et al., 2012; Kirkpatrick et al., 2013; Camacho-Cervantes et al., 2014; Dobbs et al., 2014; Conway and Yip, 2016; Roman et al., 2020). Other studies have found that trees can be sources of perceived risk in residential areas, both as potential refuges for criminals (Lohr et al., 2004; Perkins, 2011; Conway and Yip, 2016) and as potential hazards to personal safety and property (Mortimer and Kane, 2004; Lyytimäki and Sipilä, 2009; Kirkpatrick et al., 2013; Camacho-Cervantes et al., 2014; Conway and Yip, 2016). Additional disamenities described in past research have included cost (Kirkpatrick et al., 2013; Conway and Yip, 2016), presence of weeds (Kirkpatrick et al., 2013), attraction of pests (Summit and McPherson, 1998; Kirkpatrick et al., 2013; Conway and Yip, 2016), unwanted shade in the yard or garden (Conway and Yip, 2016), messy leaves and flowers (Summit and McPherson, 1998; Camacho-Cervantes et al., 2014; Conway and Yip, 2016), allergens (Lohr et al., 2004; Dobbs et al., 2014), and blocked views (Kirkpatrick et al., 2013).

2.2. Values associated with trees

Values, from a cognitive psychological perspective, have been shown to influence beliefs and attitudes (Stern et al., 1995) which, in turn, are among factors that may affect decision-making in residential landscapes (Cook et al., 2012). Values associated with the positive (or favorable) attributes of trees have included emotional connection (Hull, 1992; Coles et al., 2013; Conway, 2016), community image and aesthetics (Hull, 1992; Coles et al., 2013; Conway, 2016), environmental protection (Hull, 1992; Conway, 2016), and connection to nature (Coles et al., 2013).

In contrast to amenities, less is understood about the values that may be associated with the disamenities of trees. For disamenities like leaf debris (requiring cleanup) and infrastructure damage (with monetary costs), residents might connect these disamenities to taking away time and money from other priorities (Lopez-Mosquera and Sanchez, 2012; Arsil et al., 2016). In other studies, time and monetary savings were connected to values such as a sense of accomplishment, life satisfaction, fun and enjoyment, and general well-being (Lopez-Mosquera and Sanchez, 2012; Arsil et al., 2016).

2.3. Theoretical framework: means-end chain theory

We used the means-end chain (MEC) theory (Gutman and Reynolds, 1979) as a theoretical framework to structure our analysis. The MEC theory describes how consumers identify attributes of products and connect those attributes to their own personal values or goals (Gutman and Reynolds, 1979; Reynolds and Gutman, 1988; Walker and Crittenden, 2012). Originating in marketing, the MEC theory posits that attributes of a product and the connection of those attributes to personal values contribute to consumer decisions to purchase a product (or, when considering a behavior as the "product", to engage in that behavior). MEC theory has been applied to several environmental topics. For example, Ramirez et al. (2015) used MEC analysis to explore consumers' personal goals associated with consuming sustainable products. Bagozzi and Dabholkar (1994) found that values associated with recycling included health, providing for future generations, and sustaining life for long-term survival. Lopez-Mosquera and Sanchez (2012) applied MEC analysis and contingent valuation to estimate consumers' willingness-to-pay for peri-urban green spaces. Values associated with these green spaces included mental and physical well-being, enjoyment of landscape beauty, quality of life, and respect for others (Lopez-Mosquera and Sanchez, 2012). To our knowledge, this study is the first to apply MEC analysis to decision-making about tree retention or removal.

The MEC theory posits three levels of abstraction related to a product or behavior (Gutman and Reynolds, 1979; Reynolds and Gutman, 1988; Walker and Crittenden, 2012; Fig. 1). First, the most concrete constructs are the product attributes, which are the features of the product that consumers identify as important. For example, people identified "landscape beauty" as an important attribute of natural areas visitation (Lopez-Mosquera and Sanchez, 2012). Second, consequences are intermediate constructs that are generally the effects or results of attributes. In the natural areas visitation study, "mental well-being" was identified as a consequence of "landscape beauty" (Lopez-Mosquera and Sanchez, 2012). Finally, the most abstract constructs are values – closely held constructs of importance (Gutman and Reynolds, 1979; Reynolds and Gutman, 1988; Walker and Crittenden, 2012). For example, "better relationships with others" was identified as a value associated with "mental well-being" (Lopez-Mosquera and Sanchez, 2012). While the MEC theory focuses on the positive attributes (i.e., amenities) that drive decision-making, this study extends the application of MEC theory by also identifying negative attributes (i.e., disamenities) of trees and the connection of those negative attributes to values.

3. Methods

We focused our study on the context of homeowner decisions about utility-prescribed roadside tree removals in the state of Connecticut, USA. Several major storms in the northeastern U.S. in 2011 and 2012 (i.e., Storm Alfred, Hurricane Sandy, and Tropical Storm Irene) caused widespread tree failure and power outages, which may have influenced homeowner perceptions of the risks of trees (McGee et al., 2012). To mitigate the risk of future outages caused by trees and tree limbs in this highly forested landscape (Wharton et al., 2004), Connecticut's primary utility companies began widespread enhanced tree trimming (ETT) practices, which involve the clearance of trees or limbs within eight feet of either side of utility lines from ground to sky (e.g., Eversource Energy, 2019). Our study area included five towns in eastern Connecticut (Andover, Bolton, Coventry, Manchester, and Mansfield) that had recently experienced ETT. This area spanned a spectrum of urban to exurban residential development. As part of a broader study (see Hale and Morzillo, 2020; DiFalco and Morzillo, 2021), stakeholder interviews identified the selected towns as relevant based on history of power outages and variable town-level support for utility tree pruning and removal (coauthor, unpublished data). Maps of utility distribution lines that had undergone ETT from 2014 to 2017 were provided by Eversource Energy. ETT was implemented in 2013, and we focused on the years of 2014–2017 to maximize homeowner recall of their decision-making to consent or object to tree removals (Groves et al.,

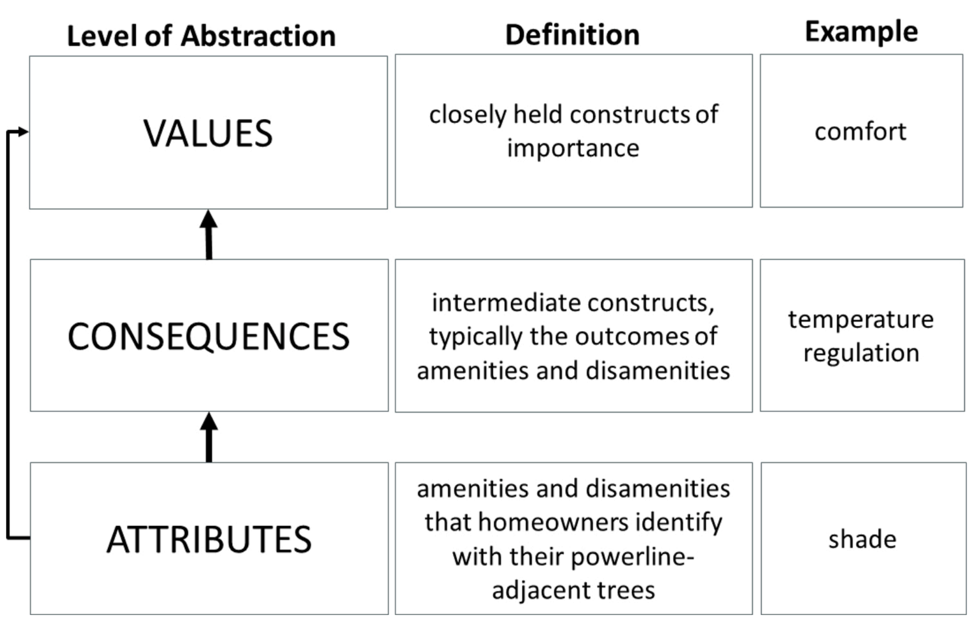

Fig. 1. The means-end chain theory encompasses three levels of abstraction, which are shown from most concrete at the bottom (attributes) to the most abstract at the top (values) (Gutman and Reynolds, 1979; Reynolds and Gutman, 1988; Walker and Crittenden, 2012).

2009).

Using ArcGIS (ESRI, 2018), we intersected polygon maps of ETT provided by Eversource Energy with tax parcel maps from the Capitol Region Council of Governments (CRCOG, 2017) to identify individual parcels at which ETT may have taken place (Fig. 2a). Next, from the identified parcels, we used the CRCOG (2017) tax parcel information to select parcels where the address of the property owner matched the parcel address (i.e., parcels with a resident-homeowner; Fig. 2b). We limited participation to resident-homeowners because these individuals are the property-level decision-makers for utility vegetation management. We then determined the assessed property value for each eligible parcel from the tax parcel information (CRCOG, 2017). Parcels were stratified based on assessed property values to ensure that a range of property values were sampled (Fig. 2c). Two strata were created, comprised of properties: (1) above, and (2) below the median assessed property value for all eligible parcels across the study area. Within each stratum, simple random sampling was used to select 300 sample parcels, for a total of 600 households. Although 600 households were included in the sample, it was assumed that only an undeterminable subset of parcels would have received a request for tree removal and thus would be eligible to participate. Potential participants were first contacted by mail using a letter that explained the study, defined eligibility for participation, invited their participation in an interview at their home, and provided the researcher's contact information (Fig. 2d). After two weeks, a reminder postcard was sent. Mailings were completed in three waves (200 addresses per wave) from June 2018 to September 2018. Additionally, in-person canvassing was used at previously contacted addresses to encourage participation, starting after the second mailing in August 2018 (Fig. 2d.). A total of 32 interviews were conducted. Participants included all eligible individuals who responded to the mailed request for interview, as well as eligible individuals who consented to participate during door-to-door canvassing. We determined that information saturation had been reached after 32 interviews (Neuman, 2006; Krueger and Casey, 2009). The University of Connecticut Institutional

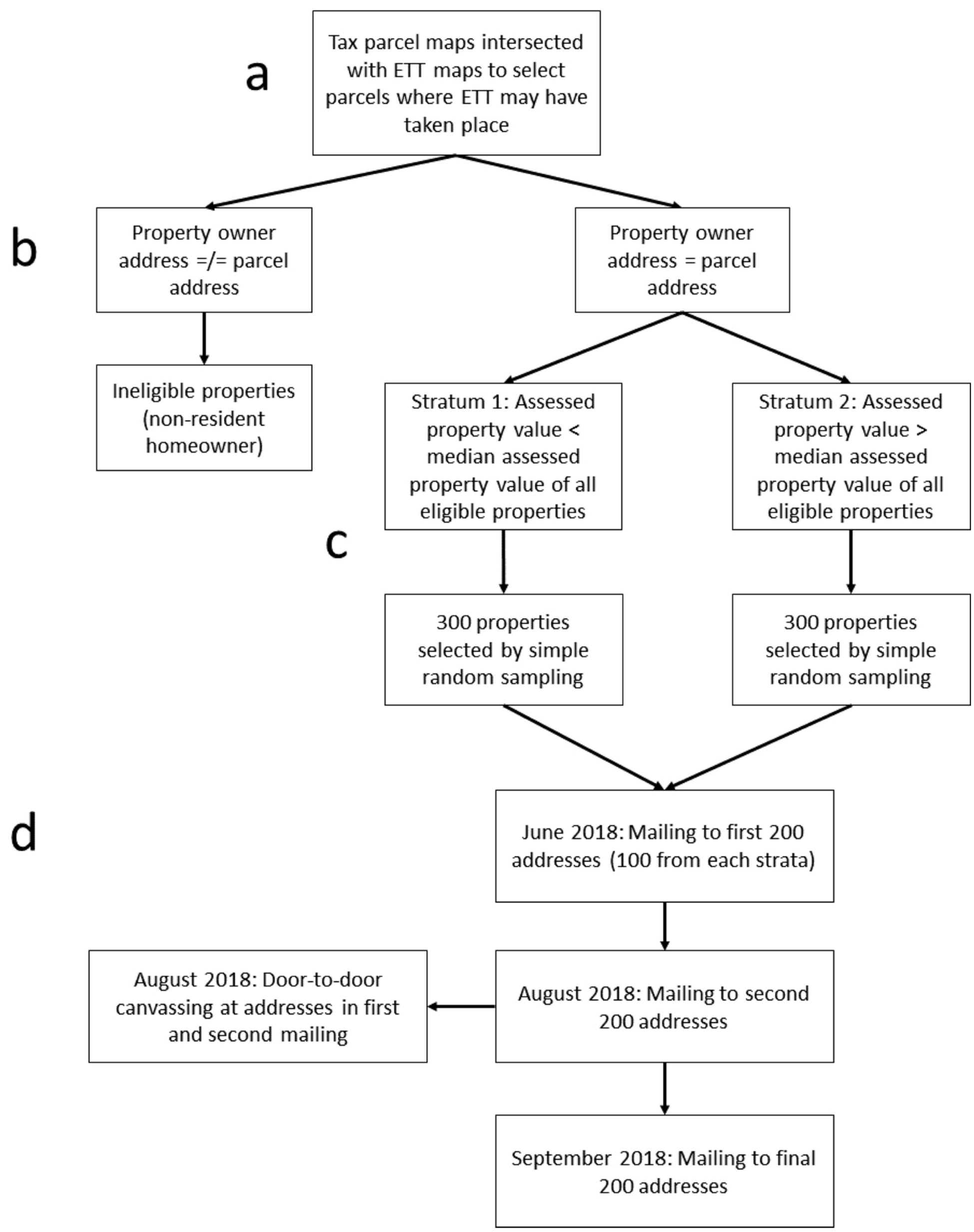

Fig. 2. Diagram of methods used for identifying and contacting potential interview participants. Parcels were identified where enhanced tree trimming (ETT) may have taken place (a) and where the parcel had a resident-homeowner (b). Eligible parcels were stratified by assessed property value (c) and simple random sampling was used to identify contacts. Mailings to identified parcels occurred in three waves (d) and were accompanied by door-to-door canvassing (d).

Review Board granted approval for use of human subjects (#H16-007).

Interviews were conducted at the participant's residence, which allowed participants to refer directly to trees in their yard during the interview (Lowery and Morse, 2013). We used one-on-one, semi-structured laddering interviews (Hinkle, 1965; Lopez-Mosquera and Sanchez, 2012) to elicit the attributes, consequences, and values that residents associated with their trees. Laddering interviews can be either "hard" or "soft" (Russell et al., 2004). Hard laddering uses predefined attributes, consequences, and values from the literature, whereas soft laddering is an open-ended process in which interviewees inductively identify the attributes of an item or behavior they consider important and the consequences and values that they associate with those attributes (Russell et al., 2004; Lopez-Mosquera and Sanchez, 2012; Walker and Crittenden, 2012; Arsil et al., 2016). Here, we used soft laddering, which is considered more appropriate than hard laddering for small sample sizes (fewer than 50 participants; Russell et al., 2004).

Each interview consisted of three main segments. First, we asked the participant to identify a tree for which the utility company requested consent to remove from their yard during the process of roadside vegetation management, and to provide some details about the tree (e.g., species, size, location, tree health at the time of the request, and whether it was pruned or removed). Second, to identify the positive attributes of the tree, participants were asked, "For that particular tree, can you identify some positive attributes of the tree? In other words, what benefits did/does the tree provide to you, your family, your community, or the environment as a whole? What did/do you like about the tree?" To elicit consequences and values, participants were then asked to explain why each attribute mattered: "You indicated that ___ was a positive attribute of the tree. Why is that attribute important to you?" For each element listed, the participant was asked: "Why is that important to you?" until a point of abstractness was reached from which the participant could provide no further information. This question sequence was then repeated for negative attributes of the tree. We elicited negative attributes by asking, "Thinking again of the specific tree you identified, can you identify some negative attributes of the tree? In other words, what costs and risks did/does the tree impose on you, your family, your community, or the environment as a whole? What did/do you not like about the tree?" We then elicited consequences and values by asking, "You indicated that ___ was a negative attribute of the tree. Why is that attribute important to you?" and iteratively continued until participants had no more comments. To provide additional context for responses, participants were also asked about their experience with the utility company, other tree management activities they had recently conducted on their property, and their ideal front yard.

We piloted the interview guide with the first five participants to identify any potential issues with question wording or clarity. At the end of the interviews with these five participants, participants were asked if any questions were unclear or if any of the question wording was confusing. All five participants indicated that the questions were clear and had no concerns about wording. Because no changes were made to the instrument following the pilot, data from the pilot interviews were included among collective data reported. Interviews were manually transcribed and reviewed for accuracy.

The interviews were first open-coded to identify attributes described by respondents and to synthesize similar concepts where appropriate (Reynolds and Gutman, 1988; Neuman, 2006; Tey et al., 2015). Then, interviews were coded for relationships among attributes, consequences, and values identified by respondents (Reynolds and Gutman, 1988; Arsil et al., 2016). Using LadderUX software (2019), we created hierarchical value maps (HVMs) to visualize attribute-consequence-value relationships described by participants. These maps consist of boxes that represent attributes, consequences, and values coded from the interviews, and arrows between boxes that represent relationships identified by participants. A cut-off value of two was used, meaning that each relationship (between an attribute and consequence, or consequence and value) included in the HVM was mentioned by at least two participants (Reynolds and Gutman, 1988; Lopez-Mosquera and Sanchez, 2012). This cut-off value was chosen to maximize the amount of information in the HVMs without hindering interpretation (Reynolds and Gutman, 1988; Lopez-Mosquera and Sanchez, 2012).

4. Results

4.1. Amenities, disamenities, and values

Participants identified a wide range of amenities and disamenities as important attributes of their yard trees (Table 1). The most commonly mentioned amenities of trees were attractiveness or beauty (n = 22) and shade (n = 19). The most commonly mentioned disamenities of trees were risk to power lines (n = 16), and the tree being dead or diseased (n = 10), which also was generally framed in relation to risk of damage to power lines and property damage (Table 1).

The means-end chain theory process revealed that participants connected the amenities of trees to several values, including closeness to nature, happiness and enjoyment, comfort, pride in one's home, aesthetics, and life (Fig. 3). Attributes like the provision of wildlife habitat and attractiveness of trees were related to closeness to nature and happiness and enjoyment. Attractiveness was also connected to pride in one's home. Shade provided temperature regulation, which was related to comfort. The visual barrier from the road that trees provide was associated with improving aesthetics. Finally, the provision of oxygen was connected to life.

Connected to tree disamenities, the most frequently identified values were avoidance of [potential] harm to others, and available time and money for other priorities (e.g., other home-improvement projects; Fig. 4). Property damage to their own and others' property and non-leaf debris (e.g., falling limbs) were connected to avoidance of [potential] harm to others. Participants did not wish for their trees to cause property damage or endanger others' safety. Both leaves and non-leaf debris were connected to the consequence of requiring cleanup, which in turn led to taking time away from other priorities. Some participants hoped to reduce the need for cleanup by removing trees, thus allowing them more leisure time. Similarly, concern about taking money away from other priorities was associated with the cost of removal.

4.2. Decision-making about utility vegetation management

Of the 32 participants, 23 of those who had received requests from the utility consented to utility tree removal and five objected. Another

Table 1
Amenities and disamenities associated with front yard trees identified by participants (n = 32).

Amenities	n[a]	Disamenities	n[a]
Attractiveness, Beauty	22	Threat to Power Lines	16
Shade	19	Dead or Diseased	10
Visual Barrier or Privacy	12	Danger to People	9
Birds and Wildlife Habitat	10	Property Damage	9
Oxygen	8	Debris, Other Than Leaves	7
Sound Barrier	5	Leaves	6
Environmental Protection	4	Too Tall or Large	6
Neighborhood Character	3	Blocks Sun/Too Much Shade	6
Interesting Tree	2	Cost of Removal	5
Air Quality	1	Too Many Trees	5
Biodiversity	1	Road Blockage or Damage	4
Carbon Dioxide Sequestration	1	Undesirable Aesthetics	3
Define Property Line	1	Hard to Mow Around	3
Low Maintenance	1	Involved in Fatal Accident	2
Provide Pine Cones (Crafting)	1	Branches Scratch House	1
Rural Environment	1	Encroach on Property	1
Floodwater Mitigation	1	Require Maintenance	1
		Attract Pests	1

[a] "n" indicates the number of participants that identified that characteristics as an amenity or disamenity.

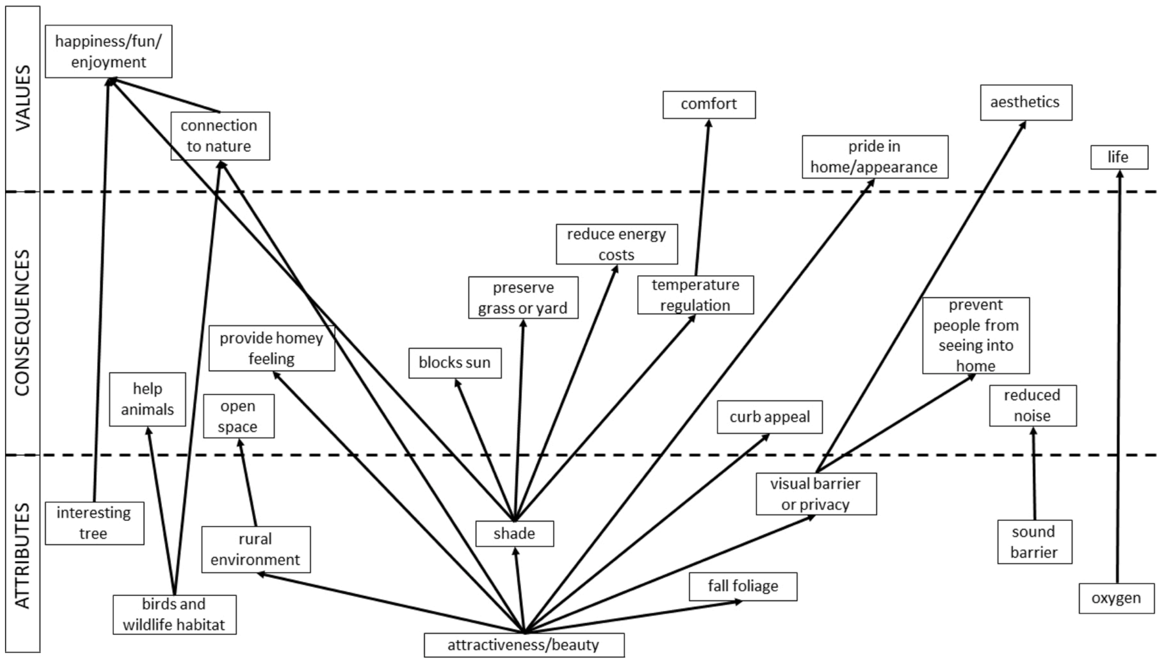

Fig. 3. Hierarchical value map for the positive attributes (amenities) that participants (n = 32) associated with front yard trees.

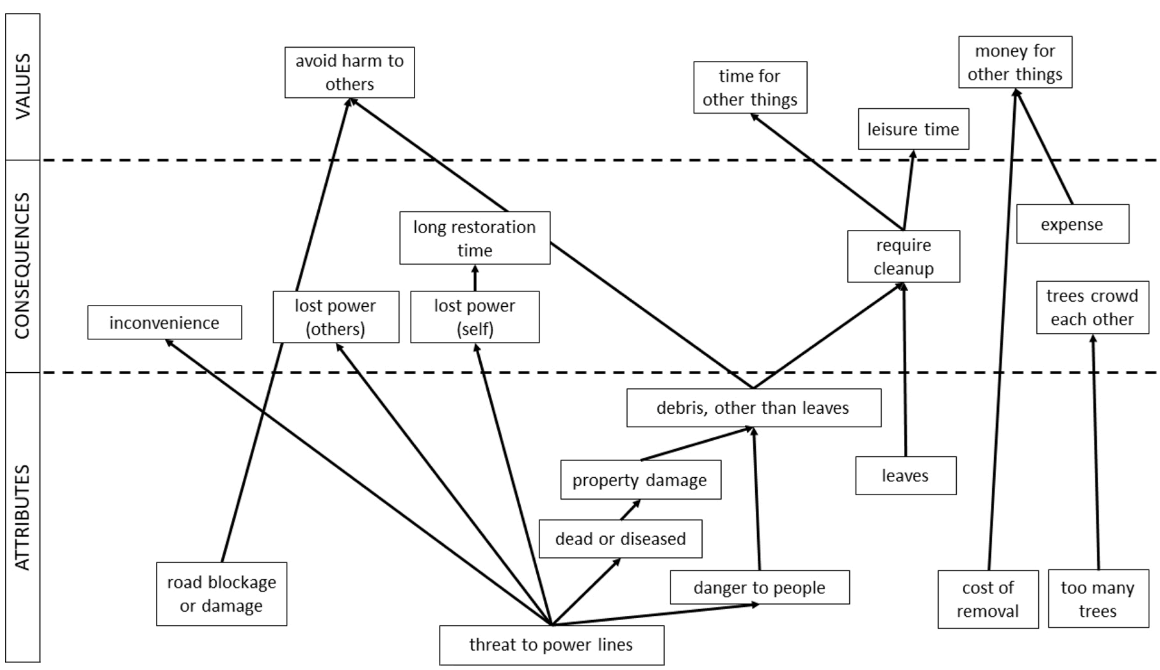

Fig. 4. Hierarchical value map for the negative attributes (disamenities) that participants (n = 32) associated with front yard trees.

participant consented to several tree removals but objected to an additional proposed removal. Three additional participants had contacted the utility company seeking removals from their property. One participant who had consented to a utility requested removal also contacted the utility company to request an additional removal. When asked how they arrived at the decision to consent or object to utility management, participants had a wide variety of responses.

Among participants who consented, three did so in order to avoid loss of power to the whole community.

"I just thought it was good for the whole community and that we don't run, you know, without electricity."

"It would knock electricity out to the whole street, multiple streets for that matter."

"I understand the importance of you know, the electrical wires, I don't want to be responsible for, you know, one of my trees hurting my neighbor's power."

Others were also concerned about the threat to the power lines because they did not want to lose their own power.

"I think they gave us an opportunity to call if we wanted to, if we had some objections [to the proposed tree removal], *but we didn't. We're in an area that loses power frequently…so our concern would be not to lose*

power, so if they felt like they had to trim to keep our power going, then we're fine with that."

Three participants indicated that they trusted the judgment of the utility company, or contracted tree crews to judge whether a tree needed to be removed.

"We figured that they're tree experts, so they know what they're doing. So, you know, we have confidence and trust in them."
"If they felt it was too close to the road for the wires, then we deferred to their expertise."
"Well, uh, they recommended it very strongly, especially after the two big storms we had in 2011 and 2012, Superstorm Sandy where we lost nine days of power in this neighborhood. We were out of power for nine days. So any time the utility companies, power lines, come down and say, we need to trim these trees back, with your permission, it's very important to keep the power going here. We always agreed."

Similarly, some felt it was "common sense" for the trees to be removed, either because they were dead or dying or because of proximity to the power lines.

"It just wasn't even a rational thing to say no, no, no, no."
"Taking the branches down was a no-brainer [i.e., no further contemplation needed to make a decision] *because, you know, as you remove the number of branches* [near] *the wires, it's gotta cut down on the power outages."*
"Well it's always been kind of obvious what was leaning over and was gonna be a problem."

Conversely, some participants felt they made the decision to consent with incomplete information. For example, one participant stated that they were not informed about which trees would be taken down.

"But when they asked for my permission, they didn't say what trees, so I was not happy that it wasn't identified for me."

Another participant felt it was unclear what would happen if she were to object to the removals.

"I mean, yeah, there was probably a box to check [to object]*, but I don't know where that would've gotten me. I don't even know if I would've then been liable for the whole street if I had refused our little tiny trees that were healthy."*

The most common reason for participants to object to a tree removal and opt to retain their tree was uncertainty about the need for removal. These participants felt that their trees did not actually pose a threat to the power lines.

"I went out and I stood where the power lines are on the road and I looked down the power lines and I looked at the tree in relation to where the power lines were and the tree was nowhere near the power lines."
"Um, he [my husband] *just didn't think it was a threat. If a branch fell, it wasn't going to fall on the power lines. It was a healthy tree, so. We just want to keep our trees."*

Participants also expressed apprehension about the contractors carrying out pruning and removals. There was concern about what a specific tree or the roadside forest generally would look like after management, particularly when a tree was scheduled for pruning rather than removal.

"They were being particularly harsh to the trees, I think, making them one-sided."
"Whoever's doing the trimming is oftentimes, not only with the trimming trees, but with the brush alongside, it's just a pure hack job … Afterwards, it looks like a war zone, everything is just hacked to bits."

In one case, a participant consented to the pruning of a tree on her property, then removed the tree completely based on its appearance after pruning.

"And actually what they did was they removed half of it that was hanging over and then when I got home from work, I said that looks stupid, I said the whole half of the tree is gone, so then my husband had to end up dropping the other – the tree itself."

5. Discussion

The objectives of this study were to identify the amenities, disamenities, and associated values that homeowners consider important for their yard trees, and to determine if and how those amenities, disamenities, and values influenced resident decision-making about utility vegetation management on their property. To guide the discussion, we focused on three aspects of the findings: (1) the amenities and disamenities identified by participants; (2) participants' decision-making process in consenting or objecting to tree removals and associated relationships with attributes and values; and (3) the role of trust in or distrust of the utility company in participants' decision-making about tree removals on their property.

Many amenities and disamenities mentioned by participants were consistent with those found in other research. Attractiveness and shade were the most frequently identified amenities. This result corresponded to several other studies noting shade and aesthetics among the most important benefits provided by trees, or among the most important reasons for planting or having trees (Summit and McPherson, 1998; Lohr et al., 2004; Camacho-Cervantes et al., 2014; Conway and Yip, 2016). Disamenities frequently identified here, including hazards to personal safety and property and threats to infrastructure (including power lines), also supported findings of others (Summit and McPherson, 1998; Lohr et al., 2004; Lyytimäki and Sipilä, 2009; Jones et al., 2012; Kirkpatrick et al., 2013; Camacho-Cervantes et al., 2014; Conway and Yip, 2016). For example, Lohr et al. (2004) found that infrastructure damage and the threat of trees to power lines were among problems that respondents identified with trees in cities. More broadly, the diversity of amenities and disamenities provided by participants for their yard trees is consistent with other studies focused on forests more generally. For example, members of the general public identify with a wide range of benefits from forests and valued urban forests near their homes for psychological restoration, recreation, and aesthetics (Hauru et al., 2015). When assessing attitudes toward private forests, Kreye et al. (2019) found a slight preference for timber harvesting for management purposes rather than for production purposes, likely due to desire to maintain forest amenities (e.g., recreation, aesthetics).

Values associated with amenities and disamenities identified by our participants were also consistent with previous literature (Hull, 1992; Lopez-Mosquera and Sanchez, 2012; Coles et al., 2013; Arsil et al., 2016; Conway, 2016), including connection to nature and happiness, fun, and enjoyment, all of which were commonly identified here. In addition, our participants connected amenities to comfort, pride in one's home, aesthetics, and life. Participants associated disamenities with the values of avoiding harm to others, time and money for other priorities, and leisure time.

Conversely, some amenities and disamenities identified as important in other studies were infrequently or not mentioned by our participants. Climate change mitigation was mentioned by only two participants in our study but was identified as an important benefit of urban trees by 30 % of participants in Conway and Yip (2016). Air quality improvement was identified by only one of our participants yet ranked as the third most important benefit in Lohr et al. (2004). Although oxygen provision was mentioned by only eight participants in our study, oxygen supply was considered an important benefit by a majority of respondents in both Camacho-Cervantes et al. (2014) and Conway and Yip (2016). While feelings of calm were not mentioned by any of our participants, Lohr et al. (2004) found that the second most important reason to have trees was for a calm feeling, and 21 % of participants in Conway and Yip (2016) ranked calm feelings as an important benefit.

Methodological differences likely contributed to variation between results of our study and previous work, such as responses related to importance of amenities and disamenities (see previous paragraph). The qualitative approach used in our study included semi-structured, open-ended questions during face-to-face interviews, during which participants developed responses spontaneously. Questions in our study also focused on a specific tree in each participant's yard. Other studies used a variety of study designs and data collection modes (e.g., mailed or telephone surveys), often including closed-ended questions (i.e., lists from which participants selected amenities and disamenities; Lohr et al., 2004; Camacho-Cervantes et al., 2014; Conway and Yip, 2016). In our case, use of open-ended questions solicited a wide diversity of responses for amenities and disamenities, some of which may not have been revealed otherwise; examples include providing pinecones for crafting (amenity), and involvement in a fatal accident (disamenity). Conversely, amenities and disamenities associated with trees not identified during our open-ended interviews may have been selected from a closed-question list on a survey if such a list had been provided. In future studies, open-ended questions could be followed with a checklist for participants to identify any other relevant amenities and disamenities.

Although concern about the threat to power lines was the disamenity most frequently mentioned by participants, we cannot conclude that it was considered the overall most important disamenity. Because the context of the study was utility company vegetation management, tree pruning and removal to mitigate the risk of power outages was mentioned as the reason for contacting participants during recruitment, as well as in the introduction to the interview. Therefore, transparently informing participants of the study context likely facilitated prominence of powerlines as a discussion topic during the interviews. Regardless, risk to power lines as a disamenity has been identified in previous work (Conway and Yip, 2016; Camacho-Cervantes et al., 2014). Problems with utility wires was one of the most important risks identified by participants in Conway and Yip (2016) following a major storm event, but mentioned by few participants (10 %) in Camacho-Cervantes et al. (2014).

Although we expected that amenities, disamenities, and values may influence resident decision-making about tree removals, supporting the means-end chain theory, results were mixed. Decisions to consent to tree removal were made largely separate from the consideration of amenities. In contrast, participants who consented to removal considered disamenities: the threat to power lines, the risk of dead or dying trees, the risk to people and property, and the desire to avoid harming others. This is consistent with previous findings, suggesting diseased trees, damage or risk to infrastructure, and the risks of fallen limbs or trees to be among the most common reasons that residents would remove a tree from their property (Kirkpatrick et al., 2013). In our study, objections to tree removal often included a consideration of the amenities of the tree. If a tree was important to a participant (e.g., because it was a rare species or otherwise unique), the necessity of removal was questioned more often. Other amenities such as the role of trees in visually screening road traffic played a role in at least one other objection. Disamenities occasionally considered in respondent decisions to object to tree removal included concern about how much a removal would cost them if an issue arose in the future, yet the decision to keeping the tree outweighed such concerns.

Our results suggested that decisions to consent or object to utility tree removals were also influenced by trust or distrust associated with utility officials and tree crews. Many definitions of trust exist; Barber's (1983) definition is commonly used in assessing trust in natural resource managers (e.g., Leahy et al., 2004), which is based on the public's perception of the resource manager's moral and technical competence. Here, moral competence, defined as the manager putting the needs of the community above his or her own needs (Leahy et al., 2004), did not emerge as a trust issue between the residents and the utility company, utility arborists, or tree crews. However, perceived technical competence, defined as resident confidence in the manager's expertise to make decisions (Leahy et al., 2004), was verified by several participants that consented to tree removals. Elsewhere in this project (Hale and Morzillo, 2020; DiFalco and Morzillo, 2021; co-author, unpublished data), survey respondents who considered vegetation managers to be accountable, defined as trustworthy, caring for trees, and professional, were more likely to accept roadside tree removals. Related to this, in our study, technical competence was questioned by participants who objected to removals. Such distrust is consistent with Kuhns and Reiter (2007), who found that participants did not believe that utility officials involved in tree pruning cared about trees and had low levels of trust that these officials would treat trees properly. The distrust observed among our participants also is consistent with declining trust in natural resources-related institutions observed elsewhere (Bengston and Fan, 1999; Leahy et al., 2004). However, other studies have identified factors that can promote trust in resource managers, including formal and informal interactions between community members and personnel (Leahy et al., 2004; Needham and Vaske, 2008), community involvement in decision-making (Leahy et al., 2004), and reflection of constituents' views in management when possible (Needham and Vaske, 2008).

The means-end chain theory as a theoretical framework and open-ended interview format applied in this study did have some limitations. With a focus on the tree attributes that homeowners considered important, the MEC framework did not always capture additional factors that may have contributed to homeowner decision-making. Some of these factors, such as trust in the utility company, emerged elsewhere in the interviews. Therefore, there likely are other factors that were not captured in our interviews (e.g., the role of subjective norms, perceived behavioral control) that could be explored with other theoretical frameworks (e.g., Theory of Planned Behavior, Value Belief Norm Theory) and data collection methods such as quantitative surveys.

6. Conclusion

People have diverse reasons to consent or object to tree removals from their properties. Knowledge of attributes of trees that residents consider important and how those attributes relate to their values can help forest managers and arborists communicate with residents through understanding of what matters most to those residents – particularly because utility vegetation management on private property largely depends on property owner consent to management. Furthermore, the diversity of responses suggested opportunity for one-on-one communication between vegetation managers and landowners to understand priorities and concerns of individual residents. While not explicitly investigated in our interviews, trust and lack thereof in utility companies and tree crews emerged as a recurring theme underlying homeowners' decisions. Further research may explore how outreach activities such as community dialogues preceding tree management efforts might help build trust between managers and homeowners in the context of residential decision-making about trees.

Author statement

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Arsil, P., Li, E., Bruwer, J., 2016. Using means-end chain analysis to reveal consumers'motivation for buying local foods: An exploratory study. Gadjah Mada Int. J. Bus. 18 (3), 285–300.
Bagozzi, R.P., Dabholkar, P.A., 1994. Consumer recycling goals and their effect on decisions to recycle: a means-end chain analysis. Psychol. Mark. 11 (4), 313–340.
Barber, B., 1983. The Logic and Limits of Trust. Rutgers University Press, New Brunswick, NJ.
Belaire, J.A., Westphal, L.M., Minor, E.S., 2016. Different social drivers, including perceptions of urban wildlife, explain the ecological resources in residential landscapes. Landsc. Ecol. 31, 401–413.
Bengston, D., Fan, D., 1999. An innovative method for valuating strategic goals in a public agency: conservation leadership in the U.S. Forest Service. Eval. Rev. 23 (1), 77–100.
Camacho-Cervantes, M., Schondube, J.E., Castillo, A., MacGregor-Fors, I., 2014. How dopeople perceive urban trees? Assessing likes and dislikes in relation to the trees of a city. Urban Ecosyst. 17, 761–773.
Capitol Region Council of Governments, 2017. Regional GIS. Retrieved from crcog.org/regional-gis/.
Cariñanos, P., Calaza-Martínez, P., O'Brien, L., Calfapietra, C., 2017. The cost of greening: disservices of Urban trees. In: Pearlmutter, D., et al. (Eds.), The Urban Forest. Springer International Publishing.
Coles, R., Millman, Z., Flannigan, J., 2013. Urban landscapes – everyday environmental encounters, their meaning and importance for the individual. Urban Ecosyst. 16, 819–839.
Conway, T.M., 2016. Tending their urban forest: Residents' motivations for tree planting and removal. Urban For. Urban Green. 17, 23–32.
Conway, T.M., Yip, V., 2016. Assessing residents' reactions to urban forest disservices: A casestudy of a major storm event. Landsc. Urban Plan. 153, 1–10.
Cook, E.M., Hall, S.J., Larson, K.L., 2012. Residential landscapes as social-ecological systems: a synthesis of multi-scalar interactions between people and their home environment. Urban Ecosyst. 15, 19–52. https://doi.org/10.1007/s11252-011-0197-0.
Delshammar, T., Östberg, J., Öxell, C., 2015. Urban trees and ecosystem disservices – A pilot study using complaints records from three Swedish cities. Arboric. Urban For. 41 (4), 187–193.
DiFalco, S., Morzillo, A.T., 2021. Comparison of attitudes toward roadside vegetation management across an exurban landscape. Land 10, 308–323. https://doi.org/10.3390/land10030308.
Dobbs, C., Kendal, D., Nitschke, C.R., 2014. Multiple ecosystem services and disservices of the urban forest establishing their connections with landscape structure and sociodemographics. Ecol. Indic. 43, 44–55.
Donovan, G.H., Butry, D.T., 2010. Trees in the city: valuing street trees in Portland, Oregon. Landsc. Urban Plan. 94, 77–83.
Dwyer, J.F., McPherson, G., Schroeder, H.W., Rowntree, R.A., 1992. Assessing the benefits and costs of the urban forest. J. Arboric. 18 (5), 227–234.
Escobedo, F.J., Kroeger, T., Wagner, J.E., 2011. Urban forests and pollution mitigation: Analyzing ecosystem services and disservices. Environ. Pollut. 159, 2078–2087.
ESRI [Computer software], 2018. ArcGIS Desktop 10.6.1. Redlands. Environmental Systems Research Institute, CA.
Eversource, 2019. FAQ (Tree Trimming). Retrieved from. https://www.eversource.com/wmeco/wms/faqs-treetrimming.aspx?nl=resources.
Groves, R.M., Fowler Jr., F.J., Couper, M.P., Lepkowski, J.M., Singer, E., Tourangeau, R., 2009. Survey methodology. Wiley Series in Survey Methodology, 2nd edition. John Wiley & Sons, Inc, Hoboken, NJ.
Guo, T., Morgenroth, J., Conway, T., 2019. To plant, remove, or retain: understanding property owner decisions about trees during redevelopment. Landsc. Urban Plan. 190.
Gutman, J., Reynolds, T.J., 1979. An investigation of the levels of cognitive abstraction used by consumers in product differentiation. In: Eighmey, J. (Ed.), Attitude Research Under the Sun. McGraw-Hill, Chicago, pp. 128–150.
Hale, D.C., Morzillo, A.T., 2020. Landscape characteristics and social factors influencing attitudes toward roadside vegetation management. Landscape Ecol. 35, 2029–2044. https://doi.org/10.1007/s10980-020-01078-6.
Hauru, K., Eskelinen, H., Yli-Pelkonen, V., Kuoppamäki, K., Setäla, H., 2015. Residents' perceived benefits and the use of urban nearby forests. Int. J. Appl. Forest. 2 (1), 1–23.
Hinkle, D.N., 1965. The Change of Personal Constructs From the Viewpoint of a Theory of Construct Implications. Ohio State University. PhD thesis.
Hirsch, R., Baxter, J., 2009. The look of the lawn: pesticide policy preference and health-risk perception in context. Environ. Plann. C Gov. Policy 27, 468–490.
Hong, S.-K., Kim, J.-M., Jo, H.-K., Lee, S.-W., 2018. Monetary valuation of urban forest attitudes in highly developed urban environments: An experimental study using a conjoint choice model. Sustainability 10, 2461. https://doi.org/10.3390/su10072461.
Hull IV, R.B., 1992. How the public values urban forests. J. Arboric. 18 (2), 98–101.
Jones, R.E., Davis, K.L., Bradford, J., 2012. The value of trees: Factors influencing homeowner support for protecting local urban trees. Environ. Behav. 45 (5), 650–676.
Kempter, G., 2004. Best Management Practices: Utility Pruning of Trees. International Society of Arboriculture, Champaign, IL.
Kendra, A., Hull, R.B., 2005. Motivations and behaviors of new forest owners in Virginia. For. Sci. 51 (2), 142–154.
Kirkpatrick, J.B., Davison, A., Daniels, G.D., 2013. Sinners, scapegoats or fashion victims? Understanding the deaths of trees in the green city. Geoforum 48, 165–176.
Kitchen, L., 2013. Are trees always 'good'? Urban Political Ecology and environmental justice in the valleys of south Wales. Int. J. Urban Reg. Res. 37 (6), 1968–1983.
Kreye, M.M., Rimsaite, R., Adams, D.C., 2019. Public attitudes about private forest management and government involvement in the southeastern United States. Forests 10, 776–798.
Krueger, R.A., Casey, M.A., 2009. Focus Groups: A Practical Guide for Applied Research, 4th edition. Sage Publications, Inc, Thousand Oaks, CA.
Kuhns, M.R., Reiter, D.K., 2007. Knowledge of and attitudes about utility pruning and how education can help. Arboric. Urban For. 33 (4), 264–274.
Kuo, F., 2003. The role of arboriculture in a healthy social ecology. J. Arboric. 29 (3), 148–155.
LadderUX [Computer software]. (2019). Retrieved from ladderux.org.
Larson, K.L., Casagrande, D., Harlan, S.L., Yabiku, S.T., 2009. Residents' yard choices and rationales in a desert city: social priorities, ecological impacts, and decision tradeoffs. Environ. Manage. 44 (5), 921–937.
Leahy, J.E., Davenport, M.A., Anderson, D.H., Jakes, P.J., 2004. Community trust in natural resource agencies: case studies from Illinois. Proceedings of the Fourth Social Aspects and Recreation Research Symposium. San Francisco State University, San Francisco, California, pp. 51–57.
Lohr, V.I., Pearson-Mims, C.H., Tarnai, J., Dillman, D.A., 2004. How urban residents rate and rank the benefits and problems associated with trees in cities. J. Arboric. 30 (1), 28–35.
Lopez-Mosquera, N., Sanchez, M., 2012. The role of satisfaction and emotional response in the choice mechanisms of suburban natural-areas users. Environ. Manage. 49, 174–191.
Lowery, D.R., Morse, W.C., 2013. A qualitative method for collecting spatial data on important places for recreation, livelihoods, and ecological meanings: integrating focus groups with public participation geographic information systems. Soc. Nat. Resour. 26 (12), 1422–1437.
Lyytimäki, J., 2015. Ecosystem disservices: embrace the catchword. Ecosyst. Serv. 12, 136.
Lyytimäki, J., Sipilä, M., 2009. Hopping on one leg – the challenge of ecosystem disservices for urban green management. Urban For. Urban Green. 8, 309–315.
Martin, C.A., Peterson, K.A., Stabler, L.B., 2003. Residential landscaping in Phoenix, Arizona, U.S.: practices and preferences relative to covenants, codes, and restrictions. J. Arboric. 29 (1), 9–17.
McGee, J., Skiff, J., Carozza, P., Edelstein, T., Hoffman, L., Jackson, S., McGrath, R., Osten, C., 2012. Report of the Two Storm Panel. Hartford, Connecticut, U.S, 42 pp.
Minor, E., Belaire, J.A., Davis, A., Franco, M., Lin, M., 2016. Socioeconomics and neighbor mimicry drive yard and neighborhood vegetation patterns. In: Francis, R. A., Millington, J.D.A., Chadwick, M.A. (Eds.), Urban Landscape Ecology: Science, Policy, and Practice. Routledge.
Mortimer, M.J., Kane, B., 2004. Hazard tree liability in the United States: Uncertain risks for owners and professionals. Urban For. Urban Green. 2, 159–165.
Nassauer, J.I., Wang, Z., Dayrell, E., 2009. What will the neighbors think? Cultural norms and ecological design. Landsc. Urban Plan. 92, 282–292.
Needham, M.D., Vaske, J.J., 2008. Hunter perceptions of similarity and trust in wildlife agencies and personal risk associated with Chronic wasting Disease. Soc. Nat. Resour. 21 (3), 197–214.
Neuman, W.L., 2006. Social Research Methods: Qualitative and Quantitative Approaches. Pearson/AandB, Boston, MA.
Nielson, L., Smith, C.L., 2005. Influences on residential yard care and water quality: tualatin watershed, Oregon. J. Am. Water Resour. Assoc. 41 (1), 93–106.
Nowak, D.J., Dwyer, J.F., 2007. Understanding the benefits and costs of urban forest ecosystems. In: Kuser, J.E. (Ed.), Urban and Community Forestry in the Northeast, 2nd ed. Springer, New York, pp. 25–46.
Nowak, D.J., Crane, D.E., Stevens, J.C., 2006. Air pollution removal by urban trees and shrubs in the United States. Urban For. Urban Green. 4, 115–123.
Perkins, H.A., 2011. Gramsci in green: neoliberal hegemony through urban forestry and the potential for a political ecology of praxis. Geoforum 42, 558–566.
Pickett, S.T.A., Burch, W.R., Dalton, S.E., Foresman, T.W., Grove, J.M., Rowntree, R., 1997. A conceptual framework for the study of human ecosystems in urban areas. Urban Ecosyst. 1 (4), 185–199.

Pike, K., O'Herrin, K., Klimas, C., Vogt, J., 2021. Tree preservation during construction: an evaluation of a comprehensive municipal tree ordinance. Urban For. Urban Green. 57.
Pincetl, S., Gillespie, T., Pataki, D.E., Saatchi, S., Saphores, J.-D., 2012. Urban tree planting programs, function or fashion? Los Angeles and urban tree planting campaigns. GeoJournal 78 (3), 475–493.
Ramirez, E., Jimenez, F.R., Gau, R., 2015. Concrete and abstract goals associated with the consumption of environmentally sustainable products. Eur. J. Mark. 49 (9/10), 1645–1665.
Reynolds, T.J., Gutman, J., 1988. Laddering theory, method, analysis, and interpretation. J. Advert. Res. 28, 11–31.
Roman, L.A., Conway, T.M., Eisenman, T.S., Koeser, A.K., Ordóñez Barona, C., Locke, D. H., Jenerette, G.D., Östberg, J., Vogt, J., 2020. Beyond 'trees are good': disservices, management costs, and tradeoffs in urban forestry. Ambio. https://doi.org/10.1007/s13280-020-01396-8.
Roy, S., Byrne, J., Pickering, C., 2012. A systematic quantitative review of urban tree benefits, costs, and assessment methods across cities in different climatic zones. Urban For. Urban Green. 11, 351–363.
Russell, C.G., Busson, A., Flight, I., Brian, J., van Pabst, J.A.V.L., Cox, D.N., 2004. A comparison of three laddering techniques applied to an example of a complex food choice. Food Qual. Prefer. 15, 569–583.
Salmond, J.A., Tadaki, M., Vardoulakis, S., Arbuthnott, K., Coutts, A., Demuzere, M., Dirks, K.M., Heaviside, C., Lim, S., Macintyre, H., McInnes, R.N., Wheeler, B.W., 2016. Health and climate related ecosystem services provided by street trees in the urban environment. Environ. Health A Glob. Access Sci. Source 15 (36), 95–111.
Smardon, R., 1988. Perception and aesthetics of the urban environment: review of the role of vegetation. Landsc. Urban Plan. 15, 85–106.
Soto, J.R., Escobedo, F.J., Khachatryan, H., Adams, D.C., 2018. Consumer demand for urban forest ecosystem services and disservices: examining trade-offs using choice experiments and best-worst scaling. Ecosyst. Serv. 29, 31–39.
Spinti, J.E., St Hilaire, R., Van Leeuwen, D., 2004. Balancing landscape preferences and water conservation in a desert community. HortTechnology 14 (1), 72–77.
Stern, P.C., Dietz, T., Kalof, L., Guagnano, G.A., 1995. Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects. J. Appl. Soc. Psychol. 25 (18), 1611–1636.
Summit, J., McPherson, E.G., 1998. Residential tree planting and care: A study of attitudes and behavior in Sacramento, California. J. Arboric. 24 (2), 89–97.
Teixiera, F.Z., Bachi, L., Blanco, J., Zimmerman, I., Welle, I., Carvalho-Ribiero, S.M., 2019. Perceived ecosystem services (ES) and ecosystem disservices (EDS) from trees: insights from three case studies in Brazil and France. Landsc. Ecol. 34, 1583–1600.
Tey, Y.S., Arsil, P., Brindal, M., Shamsudin, M.N., Radam, A., Hadi, A.H.I.A., Rajendran, N., Lim, C.D., 2015. A means-end chain approach to explaining the adoption of good agricultural practices certification schemes: the case of Malaysian vegetable farmers. J. Agric. Environ. Ethics 28, 977–990.
Walker, B.M., Crittenden, N., 2012. The use of laddering: techniques, applications and problems. In: Caputi, P., Viney, L.L., Walker, B.M., Crittenden, N. (Eds.), Personal Construct Methodology, first edition. John Wiley & Sons.
Wharton, E.H., Widmann, R.H., Alerich, C.L., Barnett, C.J., Lister, A.J., Lister, T.W., Smith, D., Borman, F., 2004. The Forests of Connecticut [Resource Bulletin NE-160]. Retrieved from. https://www.fs.fed.us/ne/newtown_square/publications/resource_bulletins/pdfs/2004/ne_rb160.pdf.