Tending their urban forest: Residents' motivations for tree planting and removal

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ABSTRACT

Drivers at multiple scales influence the management of trees, grass and other vegetation in residential yards. While significant attention has been paid to the varied drivers of residential lawn care and herbaceous vegetation, less attention has been directed at urban tree management on residential property, particularly at the finer household-scale. This study examines residents' tree planting and removal decisions in Mississauga (Ontario, Canada) to better understand the way household-scale actions shape urban forests. Analysis of survey responses and interviews indicate that residents are activity managing their trees. Tree planting and species selection decisions were primarily motivated by aesthetic preferences and maintenance concerns. Additionally, nearly all of the motivating factors identified by residents were related to personal preferences and site-level characteristics as oppose to the ecosystem services highlighted by many researchers and practitioners. Tree removal was most commonly motivated by poor tree health. However, underlying many residents' decisions were a lack of knowledge about tree care and species characteristics, which contributed to a number of healthy tree removals. Ultimately, residents' focus on aesthetics is out of alignment with municipal plans that are frequently based on ecosystem service provision, while desire for low maintenance trees and lack of tree care knowledge raises concerns about the long-term sustainability of the urban forest.

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1. Introduction

Urban residential yards are increasingly recognized as locations of important ecological services and high biodiversity (Goddard et al., 2010). Recent studies have emphasized the role of neighborhood and regional drivers of residential vegetation patterns (Grove et al., 2006; Nassauer et al., 2009; Zhou et al., 2009; Fraser et al., 2013), but there is also often significant heterogeneity in vegetation conditions within neighborhoods, at the finer household-scale (Shakeel and Conway, 2014). This fine-scale variation is, in part, a result of individual households' varied knowledge, attitudes, experiences and resources leading to different management actions and vegetation characteristics (Yabiku et al., 2008; Kirkpatrick et al., 2013; Pearce et al., 2015). To date household-level drivers have received less attention (Kendal et al., 2010), yet documenting household motivations and actions related to landscaping decisions is crucial to understanding fine-scale yard dynamics, residents' experience with local places, and broader urban ecosystem conditions.

Research examining residents' landscaping decisions has primarily focused on the presence and management of lawns and gardens in North American cities (Yabiku et al., 2008; Larson et al., 2010; Harris et al., 2012). Less well understood are the ways individual households influence tree conditions in their yards. Case studies suggest that in urban landscapes the majority of trees are located on private property (McPherson, 1998; Pearce et al., 2013) and that most of those trees were planted, rather than exist through natural regeneration (Nowak, 2012). Thus, residents collectively manage a significant portion of the urban forest.

Numerous municipalities across North America have recently increased attention and resources allocated to urban forests because of the array of ecosystem services attributed to them (Young, 2011; Pincetl et al., 2013). Many jurisdictions are adopting ambitious planting goals, and more generally looking to increase native tree species and overall diversity-levels, in an effort to create sustainable urban environments (Ordóñez and Duinker, 2013). These municipalities often recognize the central role residents' play, encouraging planting on both public and private land through a variety of programs (e.g. City of Melbourne, 2012; Ordóñez and Duinker, 2013; City of Mississauga, 2014).

While residents' collective tree planting and removal decisions impact overall urban forest conditions, as well as municipalities'

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ability to meet management goals, it is unclear how residents are making these decisions. This study examines recent residential tree planting and removal decisions in four neighborhoods in the City of Mississauga (Ontario, Canada) to identify the factors that motivate residents' actions. More generally, it presents a case study that contributes insight into key urban forestry actors who operate at a finer-scale than examined in many studies. This objective is addressed through analysis of a written survey and in-depth interviews. The following sections present an overview of research examining residents' landscaping preferences and actions, the study methods and results, and a broader discussion of the results in relation to the role of individual residents' as active managers of the urban forest.

2. Residential yard management

In light of the important role that residential yards play in urban ecosystems, there is a growing emphasis on documenting residential yard conditions and understanding the factors associated with the heterogeneity of those conditions in the Global North (e.g. Marco et al., 2008; Zhou et al., 2009; Larson et al., 2010; Giner et al., 2013). Cook et al. (2012) identified three scales of 'human drivers' related to residential yard conditions: the municipal-regional scale, capturing government ordinances and market and economic influences; the neighborhood-scale, reflecting formal and informal institutions related to social norms and structures; and the household-scale, representing attitudes, knowledge, and household structure.

Many studies emphasize the ways factors at the municipal-regional and neighborhood scales influence urban vegetation patterns, with particular attention given to social pressures and political inequality. For example, in the US maintaining a well-groomed lawn is frequently framed as an imposed burden that homeowners bear to meet neighborhood expectations, demonstrate good character within their community, support property values, and/or abide by municipal laws or homeowner covenants (Robbins, 2007; Blaine et al., 2012; Carrico et al., 2012; Fraser et al., 2013). Pressure to demonstrate good character or convey social status has also been associated with tree planting (Lawrence, 2006; Clarke et al., 2013; for exception where neighborhood pressure does not appear to be a factor, see Kirkpatrick et al., 2009). Additionally, neighborhood-level unevenness in tree canopy cover has been explained as higher income areas having greater availability of resources, including political influence, which results in more municipal and private tree planting (Heynen et al., 2006).

At the household-scale, studies have examined residential lawn management and garden characteristics (Marco et al., 2008; Larson et al., 2009). For example, Harris et al. (2012) exploration of homeowners in suburban Massachusetts identified a variety of attitudes towards lawns. While some residents reluctantly maintain their yards due to external pressures, others demonstrated emotional attachment to their grass and a third group was actively diversifying their yard vegetation because they wanted to reduce the extent of lawn. When considering herbaceous gardens, recent research has emphasized the ways individual preferences for specific plant aesthetics varies (Goddard et al., 2013), with aesthetic preference and site conditions the most common criteria for selection of species to plant (Kendal et al., 2012).

Kirkpatrick et al. (2013) note that relatively little attention has been given to the attitudes, perception, and experiences of residents in relation to trees. However, residents' knowledge and experiences appear to be related to both their level of support for urban forest protection (Davis and Jones, 2014) and actual urban forest conditions (Pearce et al., 2015), highlighting the importance of understanding these household-level factors. A small but

growing body of research has begun to examine individuals' preferred traits, desired benefits, and perceived annoyances associated with urban trees. Several studies have suggested that aesthetics is the most common positive attribute residents' associate with trees in multiple cities around the world (Flannigan, 2005; Pataki et al., 2013; Camacho-Cervantes et al. 2014; Avolio et al., 2015). Tree debris is a common annoyance (Flannigan, 2005; Camacho-Cervantes et al., 2014).

Beyond the broad interest in aesthetic features, an in-depth study of urban forest values in Columbia found participants associated aesthetic, ecological, psychological and sociocultural values with the urban forest (Ordóñez and Duinker, 2014). Flannigan (2005) study of residents' attitudes toward trees in England documented variations between the three communities examined, while Schroeder et al. (2006) found differences in preferred traits between residents of US and UK cities, including level of interest in shade production. Through in-depth interviews with residents in Melbourne (Australia), Pearce et al. (2015) documented that residents experience trees in at least five broad ways, including through the provision of (tangible and intangible) products, which were not always desired (e.g. risks). Thus, while trees' contributions to visual aesthetics are widely valued, other desired tree traits, benefits, and experiences appear to be more varied.

Only a few studies have directly examined individual motivations for residents' tree planting and removal decisions. For example, Summit and McPherson (1998) conducted a survey of residents in Sacramento (California) that explored tree planting activity. Trees were most likely to be planted in the first five years of residency, with shade and aesthetics given as the most common motivations for planting. Sixty-six percent of residents had also removed at least one tree, typically due to death or disease of the tree. Residents who planted the tree or helped plant the tree expressed increased satisfaction with those trees and were less likely to want to remove it in the future (Sommer et al., 1994; Summit and Sommer, 1998).

More recently, Kirkpatrick et al. (2012) surveyed residents in six Australian cities about tree planting and removal actions. Their results suggested residents primarily plant to improve yard aesthetics, attract wildlife, increase privacy, and/or for the beauty of the flowers. Most trees were removed due to disease or advanced age, followed by removal of trees that were causing problems (i.e. root damage). Common attitudes included tree lovers, those that focus on a particular benefit of trees (i.e. wildlife attraction) and those who dislike trees, highlighting the variation in individuals' underlying attitudes. In southern California, surveyed residents said they select trees primarily based on size, fruit production and growth rate (Pataki et al., 2013), but preferred tree traits varied by residents' age and gender, as well as local environmental conditions (Avolio et al., 2015). This study examines residential tree planting and removal decisions in the eastern temperate forest of North America using qualitative methods to explore the range of motivations and rationales provided by residents.

3. Methods

3.1. Study area

The study area is comprised of four neighborhoods in the City of Mississauga (Ontario, Canada), located just west of Toronto along the Lake Ontario shoreline (Fig. 1). With a 2011 population of 713,443 (Statistics Canada, 2011), Mississauga is Canada's sixth largest city. The city contains a mix of residential neighborhoods (ranging from large apartment towers to fully detached homes), shopping complexes, employment centers, industrial areas, and historic town centers. Its population is highly diverse, with 51%