



Public attitudes about urban forest ecosystem services management: A case study in Oregon cities[☆]



Joshua W.R. Baur^{a,*}, Joanne F. Tynon^b, Paul Ries^c, Randall S. Rosenberger^b

^a Department of Health Science and Recreation, San Jose State University, One Washington Square, SPX 212, San Jose, CA 95192, United States

^b Department of Forest Ecosystems and Society, Oregon State University, United States

^c Department of Forest Ecosystems and Society, Oregon State University Oregon, Department of Forestry, United States

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ABSTRACT

Rapidly growing human populations worldwide create management challenges to support ecological and human wellbeing. Including human dimensions in research and planning, especially in urban locations, can help natural resource management become more integrated and balanced. To help inform natural resource management, we looked at human dimensions of forest ecosystems, focusing on urban forests. We carried out a case study comparing homeowners' and renters' attitudes about urban forest management goals, and what each group considers indicators of successful urban forest management. Using mixed mode methods in four cities in Oregon, U.S.A., we found that, in general, homeowners and renters agree that watershed health, ecological health, habitat preservation, and sustainability are important management goals. Data revealed minor variation between homeowners and renters, with renters generally expressing stronger opinions. Homeowners and renters also tended to agree that more green space and more natural habitat were indicators of successful management. Where statistically significant differences between groups were found, practical differences (effect sizes) were mostly small. Results indicating the importance of intangible benefits to both groups suggest that urban natural resource managers might be able to strengthen outreach and engagement by expanding the ecosystem services narrative to include more focus on aesthetics and recreation. Direct experience through recreation opportunities has potential to improve city resident awareness and interest in urban forests and green spaces. Managers may need to improve outreach concerning tangible benefits such as property values as well. Results also suggest that renters represent a category of city residents that appear motivated to get more engaged with urban forest planning and management. Given that our research method was a case study, caution is recommended if applying our results to other cities in the U.S. and internationally. Nevertheless, we are hopeful that results from this research will provide useful information that contributes to urban human and ecological wellbeing in cities in the U.S. and abroad.

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1. Introduction

The rapid growth of global human population (U.S. Census, n.d.a) is occurring primarily in and near urban areas (Schneider et al., 2009; U.S. Census, 2012; Wu et al., 2011). In the U.S., for instance, most residents are urban dwellers (Office of Management and Budget, 2009), and projections indicate this will remain so (Alig et al., 2004; Nechyba and Walsh, 2004). Rising urban population numbers will have direct and substantial impacts on natural

resources (Cannell et al., 1999; McDonald et al., 2008; Pickett et al., 2011; Pouyat et al., 2006; Seto et al., 2010; Shochat et al., 2006; Vitousek et al., 1997). Improving our understanding of the relationship between urban populations and ecosystems in and around cities will be necessary for integrated and balanced natural resources management decisions.

The aim of the work discussed here is to help natural resource decision makers in the U.S and elsewhere improve their understanding of city residents' attitudes about urban forests and other green spaces. We developed this study in partnership with Oregon's Department of Forestry, which is actively expanding its urban forestry program, to answer three interrelated research questions. What are the attitudes of Oregon urban residents about urban forest management practices? Do these attitudes impact the efficacy of current urban forest management practices (and if so, how)? How

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* Corresponding author.

E-mail address: Joshua.baur@sjsu.edu (J.W.R. Baur).

might urban forest managers adjust current management practices to better respond to city residents' attitudes? We focused on four Oregon cities because these cities exhibit many of the same problems that characterize urban areas globally. The subject cities represent a sound case study to explore issues of public response to urban forest management which can help inform forest management in Oregon, the U.S., and internationally.

To answer our research questions, we asked our sample what they felt important urban forest management goals are, and what they believed are good indicators of successful urban forest management. Our work began with focus groups for two types of stakeholder – natural resource professionals and residents. Natural resource professionals (e.g., urban foresters, parks and recreation staff, open space managers, wildlife managers) and city staff (e.g., city and county planners, district managers) discussed their understandings of urban forest management and what they perceived were the public's attitudes and perceptions. Natural resource professionals reported that they were very motivated to improve their understanding of residents' attitudes about urban forestry management. They were especially interested in renters' attitudes, about which little information is currently available. In response to this information gap, we compared homeowners' and renters' attitudes. Focus groups consisting of residents helped us to understand important urban forest management topics that should be included in our questionnaire. We compared homeowners and renters, and looked at potential differences in attitudes among the four cities included in the study. Comparative analysis between homeowners and renters, and among different cities revealed few differences.

2. Literature review

Human activities, including settlement, land alternation, and policy and management practices all have a direct impact on the natural environment, especially in an urban setting (Beardsley et al., 2009; Bright et al., 2003; Machlis et al., 1997; Seto and Shepherd, 2009; Wu et al., 2011). Indeed, as Machlis et al. (1997) suggest, “[h]uman variables as both the cause and the consequence of system change. . . need to be joined to the traditional biophysical concerns of the forester, agriculturalist, range manager, and park superintendent” (p. 348). For academics and practitioners to provide an integrated accounting of urban forest valuation, additional study and evaluation is needed (Roy et al., 2012).

2.1. Defining urban forests and green spaces

Definitions of an urban forest vary (Konijnendijk et al., 2006; Nowak et al., 2010). One approach defines the urban forest as the entire tree canopy made up of individual trees, groves, and patch forests found on public or private properties including streets, parks, other public open spaces, and residential properties (Wolf and Kruger, 2010). Another way to conceive of urban forests and city green spaces is through the paradigms of urban ecological networks (Ignatieva et al., 2011) and green infrastructure (Gill et al., 2007). These paradigms view natural elements within city boundaries as consisting of different interconnected natural elements that all function within a larger system. An urban forest is one of these elements, as are other urban green spaces such as parks or greenways.

The terms *urban green spaces* and *urban forests* have considerable overlap, as urban green spaces help to make up the urban forest, and urban forests can be considered to contain other types of green spaces. Street trees, remnant forest, green and blue ways, parks, open lots, residential areas, green roofs, and many other green/natural components with an urban boundary are all part of the ecology of a city such that neatly disentangling them is

challenging, and perhaps even undesirable. In the present discussion, we define an urban forest as all publically and privately owned trees and other plants, in and around a city. This definition necessarily implies inclusion of green spaces. This question of definition highlights the importance of how human beings interpret natural elements that surround us because our attitudes and perceptions clearly influence our behaviors in relation to these resources (Dwyer, 1995; Yli-Pelkonen, 2008).

2.2. Attitudes and behaviors

Consideration of the dimensions of natural resources management necessitates a brief discussion of attitude. Attitude, considered by some to be among the most important concepts in social psychology (Crano and Prislin, 2008; Eagly and Chaiken, 1993), is defined as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly and Chaiken, 1993; p. 1). The relationship between attitudes and behaviors has been generally modeled as layered or hierarchical with attitude acting as a key contributor (Johnson and Boynton, 2010). Researchers have proposed that attitudes influence behavior (Ajzen, 2001; Ajzen and Fishbein, 2000; Johnson and Boynton, 2010; Kim and Morris, 2007; Mukhopadhyay et al., 2008) in differing ways. Cognitive hierarchy theory (Homer and Kahle, 1988; Vaske and Donnelly, 1999; Whittaker et al., 2006) suggests that attitudes act as an intermediary between values and beliefs, and motivations and behaviors. Fishbein and Ajzen (1975) argue that attitudes are formed based on cognitive, or information-based processes.

Ajzen's Theory of Planned Behavior (TPB) (Ajzen, 2001; Ajzen and Fishbein, 2000) seeks to explain behavior by identifying factors that are more directly linked to a specific behavior, and which act as intermediaries between a specific behavior and more general underlying traits. The TPB argues that specific attitudes about a behavior are directly linked to intention, which in turn drives behavior. It is the specific cognition about the favorability of a target object or action which is assumed to produce an attitude.

The notion of specificity is central to another theory of influences on behavior vis à vis attitude, that of cognitive hierarchy (Homer and Kahle, 1988; Milfont et al., 2010; Vaske and Donnelly, 1999; Whittaker et al., 2006). According to this theory, behaviors are based on a hierarchical organization of influences. Fundamental values (Rokeach, 1973; Schwartz, 1994) form the foundation or base, upon which are layered value orientations or basic belief patterns (Fishbein, 1963; Stern and Deitz, 1994) followed by general attitudes and norms, specific attitudes about an object or action (Schultz and Zelezny, 1999), behavioral intentions (Fishbein and Ajzen, 1975) and, finally, a behavior. Cognitive hierarchy theory has demonstrated how specific attitudes mediate the relationship between general values, beliefs and attitudes, and various behaviors, including environmental behaviors. The brief consideration of the above research highlights the connection between attitudes and behaviors, and how attitudes about natural resources and their management might impact people's actions in response to natural resources and their management (Rossi et al., 2015).

2.3. Public attitudes and natural resource management

Accounting for public attitudes and perceptions in natural resource management can be a key to effective management (Hansla et al., 2008; Larson, 2009; Schultz et al., 2005; Vaske and Donnelly, 1999) because different public and private stakeholders may hold conflicting interests in a resource (Nie, 2003). Multiple and varied stakeholder groups creates a condition in which a complex mixture of individual freedom, property rights, and governmental regulation must be balanced (Bright et al., 2002; Bright

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