

JUST AND EQUITABLE ACCESS: DEVELOPING AND TESTING A METHODOLOGY
THAT REPRESENTS DIVERSE PERCEPTIONS OF THE IMPORTANCE OF FORESTS

By

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ABSTRACT

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The United States has committed itself to sustainable forest management (SFM), managing its forests to meet the needs of present and future generations. Requiring an informed, aware, and engaged public, SFM theoretically calls attention to the social aspects of forest management reflecting the diversity of society. The literature suggests those participating in forestry research are mostly middle- to senior-aged, college-educated, white males, resulting in data that do not accurately represent the diversity of people living in the U.S. Though many natural resource professionals commonly equate this phenomenon to a lack of interest from those that do not participate, research indicates that people do not participate because of the lack of opportunity and access. Understanding perceptions from the diversity of people is vital because perceptions may influence opinions and acceptability of every aspect of forest management. As the racial and ethnic composition of the U.S. continues to diversify in the coming years, addressing this lack of access and representation becomes increasingly significant.

This study attempts to address the issue of the under-representation of racial minorities and women in forestry research by testing the mixing of survey sampling and data collection modes. Following a national focus group study that identified many ways that forests and trees are important to diverse people, a survey questionnaire was developed and administered to residents of the urban midwestern city of Lansing, Michigan. The survey was administered either via mail or in-person, and the sampling occurred in one of three ways: random, disproportionate

random, and purposive. Following the survey data collection, interested participants were contacted to participate in an evaluative focus group or interview.

Most of the scales developed for this study were successful at measuring the importance of forests to people. Positive correlations and level of agreement with scales show that participants had an overall positive attitude towards trees and forests. Many differences on the perceived importance of trees and forests were found based on race/ethnicity, gender, and the mediating effects of education level. Findings suggest that mixing sampling and survey data collection modes increases representation of racial minorities. Follow-up interviews and focus groups with survey participants provided valuable information on perceptions of survey research and tips for improving the survey research process.

This study is one step on the path towards creating a more inclusive and diversified research and decision/policy-making process in the field of forestry (and for the natural resources field more broadly). It presents a unique approach to collecting data on the importance of trees and forests from a diverse audience and contributes to the limited body of literature examining racial and ethnic minorities, women, and the environment. Results exemplify the relevancy for participation of women and nonwhite minorities highlighting the need to consider issues of justice and equity in research methodologies.

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To all the women who have struggled through the process.

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CHAPTER 1:

INTRODUCTION

“One of the things that causes the most conflict is that a lot of the things that we place value on, in forests, are very difficult to quantify...you can put a dollar amount on it, and real estate value, but it kind of becomes a lot more than that, and that’s what causes a lot of conflict and argument. It’s got this dollar value maybe because of the lumber or whatever, but people place more (value) on it than that.”

(Focus group participant, 2008¹)

People depend on trees and forests for a variety of uses ranging from basic survival providing clean water and air, to cooking fuel, food, medicine, recreation, and more. Where there are natural resources, there are equity issues. Where there are forests, there are power struggles over who has access to and/or management of forests. Forest issues have long been contentious as people and societies debate their access and use which is often dictated by policy.

In the past 100 years, United States (U.S.) forest policy has been slowly trending toward inclusive decision-making processes in management. In the early 1900’s, forest management on national forests was bound to a “sustained yield” philosophy focused primarily on timber and wood fiber management. In 1960, the Multiple Use Sustained Yield Act called for managing public forests for a broader suite of uses including recreation, wildlife, range, water, as well as timber. Nine years later, the National Environmental Policy Act (NEPA) was passed in response to growing environmental concerns in the U.S. NEPA charged administrative agencies to include public participation in the rulemaking process and to conduct environmental assessments to

¹ Quote taken from data used to inform the USDA Forest Service 2010 National Report on Sustainable Forests

guide decision-making on public lands. In theory, these policies should ensure that forest management decisions are informed by public participation and research. In practice, the level of inclusive decision-making in federal forest management is low. Racial and ethnic minorities and women are among those traditionally under-represented in forestry-related research that informs policy, resulting in policy that may not accurately represent the U.S. populace.

The movement for sustainable development has affected forest management in the U.S. The term sustainability has become a buzz word, prompting a definition for context. The Brundtland Report (World Commission on Environment & Development, 1987) defined sustainability as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” In 1992, the United Nations Conference on Environment and Development (i.e., the Earth Summit) was held to call attention to the urgency to address environmental problems. This global conference provided an international wake up call for Sustainable Forest Management (SFM). SFM is a complex idea that includes actions which are environmentally benign, economically viable, socially beneficial, and balance present and future needs (Grumbine, 1994). SFM should take into account the numerous uses of each individual forest (beyond those accounted for in the Multiple Use Sustained Yield Act), which may be managing forests for timber and wood fiber, but may also include managing for a variety of uses including water and air quality, wildlife habitat, range land, hunting, recreation, aesthetic, indigenous and spiritual use. In addition to publicly managed forests, SFM may also be applied to other types of forestland such as private, community, and urban forests.

The United States joined the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests in 1994 (the Working Group is now referred to as the Montreal Process, as it first met in Montreal, Quebec).

Twelve countries participate in the Montreal Process including Argentina, Australia, Canada, Chile, China, Japan, Republic of Korea, Mexico, New Zealand, Russian Federation, USA, and Uruguay. Montreal Process participants agreed to the following tasks: 1) Come to consensus on what constitutes SFM; 2) develop and promote internationally agreed-upon SFM criteria and indicators; and, 3) to report every five years on progress towards SFM. This ongoing and evolving process has had some success in measuring ecological and economic variables associated with SFM. Measuring social variables has proven to be difficult.

The first national reports on SFM by member countries were released in 2003. In 2006, the Pinchot Institute for Conservation published an analysis of the 2003 USDA Forest Service National Report on SFM (Pinchot Institute for Conservation, 2006). The Pinchot Institute's analysis described the social section as poor, citing a lack of relevant data. In 2008, Montreal Process member countries revised the indicators, adding two new social indicators and deleting others.

In preparation for the 2010 USDA Forest Service National Report on Sustainable Forest Management, indicator 6.44, "The Importance of Forests to People" was developed to describe and measure the extent and intensity of behaviors and attitudes through which individuals and communities connect with forests. The purpose of this indicator was to collect data on the range of ways that trees and forests are important, and from a range of people in order to inform an understanding of regional or demographic differences on the importance of trees and forests to people (USDA Forest Service, 2011).

Collecting data to inform this new indicator is challenging because social research in forestry often lacks racial, ethnic, and gender diversity. An extensive literature review conducted on the importance of forests strongly suggests that data on forest values in the U.S. have mostly

been collected from White/Caucasian males (Pynnonen Hopkins, McDonough, & Blaha, 2014), even though the U.S. population is racially diverse and 50.8% female (U.S. Census, 2013) (Table 1).

Table 1: Racial and ethnic composition of the United States

Race/ethnicity	Percentage
White/Caucasian	77.7%
Black/African American	13.2%
American Indian	1.2%
Asian	5.3%
Hawaiian and other Pacific Islander	0.2%
Two or more races	2.4%
Total*	100%

*persons of Hispanic/Latino origin: 17.1%, White persons non-Hispanic: 62.6%
(U.S. Census Bureau, 2013)

In addition to a lack of diversity in research, most often, those engaging in forestry-related public participation activities are middle- to senior-aged, college-educated white males (McDonough, Russell, Burban, & Nancarrow, L., 2003; Smith & McDonough, 2001). There tends to be very little representation of other racial/ethnic identities or women. This occurs across many institutional levels, from federal agencies to small nonprofits.

The natural resources field, in general, lacks racial and ethnic minority and gender-diversified representation and recruitment in professional, governmental and non-governmental organization positions (Kuhns, Bragg, & Blahna, 2002). This has been reinforced over time due to institutional factors that are slow to change (Taylor, 2008; Taylor, 2011). With racial and ethnic minorities and women at the forefront of the environmental justice movement, it is clear

that a lack of interest in the environment is a poor argument (Kaalund, 2004; Parker & McDonough, 1999; Prindeville, 2004; Sze, 2004; Taylor, 2008).

Research shows that women express slightly greater environmental concern than men and tend to prioritize environmental issues differently (Bell & Braun, 2010; Dietz, Kalof, & Stern, 2002; Hunter, Hatch, & Johnson, 2004; McCright & Xiao, 2014). Other studies show that women are generally the initiators and leaders in environmental justice activism (Bell & Braun, 2010; Verchick, 2004). Increasingly, women of color are leading efforts to combat environmental injustices in their communities (Kaalund, 2004). Still, top leaders and decision makers in forestry-related policy positions tend to be white and male (Anthony, Knuth, & Lauber, 2004; Burns, Schlozman, & Verba, 2009; McDonough et al., 2003; Taylor, 2002).

Despite the racial and gender diversity of the U.S., forestry and natural resource research continues to struggle with inclusivity. It is common for natural resource professionals to equate the underrepresentation of diverse voices to a lack of interest from those underrepresented, but research shows another explanation: that people do not participate because of the lack of opportunity and access (McDonough, 2003; McDonough et al., 2003; Taylor, 2008). This then becomes a justice issue. Failure to include people in the research process that informs policy and decision-making limits their access to that same policy and decision-making.

The environmental justice literature emphasizes the need to address social issues that intersect with wicked environmental problems. Disregarding these phenomena has a negative impact on the goals of sustainability (Pearsall & Pierce, 2010; Taylor, 2011). While it is true that some people may not wish to be included in research, it is also true that some are more willing to participate in research if the methods are more personal or compatible within their community. It is not just an issue of those who wish to participate and those who do not. By not providing

accessible means to participate in research that informs policy and decision-making, certain people are privileged in the policy process and the lack of representation becomes an issue of equity (McDonough et al, 2003).

Though there are slight variations in the data projections, studies strongly suggest that the U.S. will experience an increase in racial and ethnic minority populations in the coming forty years and a decrease in the White/Caucasian population (Collins, Hall, & Neuhaus, 1999; Ortman & Guarneri, 2009; Toosi, 2002; Waddington and Velkoff, 2010), making it even more important to study diverse populations (including women) in natural resource management (Dietz et al, 2002; Hunter et al, 2004; McCright & Xiao, 2014; and others). For example, racial and ethnic minority concerns have been reflected through environmental activism in regards to toxic waste and pollution in their communities affecting health (Sze, 2004; Taylor, 2008). Therefore, some might place a higher value on managing forests for improving air and water quality whereas this may not have been recognized as a priority management objective before the underrepresented group had been queried.

An inclusive research methodology addressing how trees and forests are important to people has the potential to bring diverse voices to SFM by monitoring the importance of forests to a representative cross-section of the nation's citizens over time. It can also provide a baseline for monitoring diverse groups of people's perceptions of the importance of trees and forests. In order to produce quality baseline data, the research sample needs to be representative of the racially diverse United States populace, including traditionally under-represented groups. The sample should be comparable to the racial/ethnic and gender composition of the population.

Focus groups were used to develop importance of forests to people data for the U.S. 2010 National Report on Sustainable Forest Management (described in more detail below). While the

focus group method is an excellent tool for collecting and measuring diverse perceptions, it is a labor intensive approach and does not allow generalization to a broad population. One solution is to develop a generalizable sample of diverse people who can then be “surveyed” in order to represent all interests in SFM over time; however, this poses a serious methodological challenge.

Study purpose:

One purpose of this study is to respond to the lack of diverse representation of racial/ethnic minorities and women in forestry-related research by developing a more inclusive survey research methodology and to contribute to democratizing the research process and forestry decision-making. A mix of sampling and data collection modes is explored to assess effectiveness for drawing a representative sample. The second study purpose is to examine differences by race/ethnicity and gender in the ways that trees and forests are perceived to be important. It is a step in the direction to meet the goals of sustainable forest management by collecting the range of data on the importance of trees and forests from the range of people.

Organization of the dissertation:

Chapter 2 of this dissertation synthesizes the literature on the different ways that trees and forests are represented as important to people in various disciplines and fields of study. It also presents literature on research methodologies and addressing the challenge of studying diverse populations. Chapter 3 provides details on the research methodology used in this study. Chapter 4 presents the results and discussion. Chapter 5 summarizes the analysis and provides conclusions and recommendations. Supporting material such as research instruments and related items may be found in the references and appendices.

CHAPTER 2:

LITERATURE REVIEW

“Tree at my window, window tree,
My sash is lowered when night comes on;
But let there never be curtain drawn
Between you and me.”

-Robert Frost (1916)

The 2005 Millennium Ecosystem Assessment (MEA), *Ecosystems and human well-being: Synthesis*, provided a starting point for examining the importance of trees and forests to people. The assessment is global in scope and provides an overview of ecosystem services in relationship to human well-being (MEA, 2005). The MEA (2005) categorized ecosystem services as provisioning, regulating, supporting, and cultural, which directed a literature review on the importance of trees and forests relating to cultural heritage, spirituality, knowledge systems, education, aesthetics, social relations, sense of place, and recreation.

The Importance of Understanding Values:

In addition to the large racial and ethnic diversity of the U.S. populace (Table 1), there is a great range of reasons that trees and forests are important to people. Research has demonstrated the breadth of ways people associate importance with forests. These perceptions vary with different types of forests, groves of trees, and even individual trees. Furthermore, different groups of individuals hold diverse perceptions across these types of forests. The mix of values

extends from consumptive to non-consumptive uses and includes items that relate to economic, ecological and social benefits derived from trees and forests.

Understanding how individual and societal values are linked to ecosystem services is central to creating a metric for measuring the importance of forests to people. Rokeach (1968) noted that “. . . values have long been a center of theoretical attention across many disciplines – philosophy, education, political science, economics, anthropology, and theology, as well as psychology and sociology” (p. 158). Vaske and Donnelly (1999) argued several points about values that relate to measuring the importance of forests to people. First, values represent single, stable beliefs that people use for evaluating attitudes and behaviors, and second, values underlie value orientations (i.e., patterns of basic beliefs), which influence attitudes and may affect behavioral intentions (also Rokeach, 1973). Value orientations relating to natural resources, they suggest, are found along a continuum from anthropocentric to biocentric. Ford, Williams, Smith, and Bishop (2014) developed a model for understanding the formation of public acceptability judgments which suggested that people employ their values for the environment through psychological processes based on beliefs, aesthetic experience, and trust. Ecologist E.O. Wilson (1984) has advanced a hypothesis suggesting humans have an “innate tendency to focus on life and lifelike processes.”

Economists focus on values which affect the way people behave in their use of limited resources, and differentiate between values which are *held* by people for something, and the values that people *assign* to things, denoting the item’s relative worth (Power, 1980). Kempton, Boster, and Hartley (1995) found that Americans in particular are motivated by a diversity of values from religion to those related to human utility, and even by a strong belief that nature itself has rights.

There are a number of authors who have explored values related to forests. Patel, Rapport, VanDerlinden, and Eyles (1999) studied forests and societal values held by scientists as well as public perceptions of forest health. This qualitative study used focus groups to explore ecological indicators, how society defines forests and forest health, the values placed on forests, and relating societal and scientific views of forests and forest condition. Participants in the six focus groups (held in London and Grand Bend, Ontario) perceived forests as complex, diverse, and multifaceted entities. Key elements of their definitions involved themes of: holism and interconnectedness; a balance of life forms; a diversity of species; cycles of change such as death, decay, and fire; a state of being pristine, or without human intervention; sensual aspects, especially visual features; and metaphors such as refuge, home, origin, sacred place, hospital, and living being or entity. Healthy forests were viewed as pristine places with high diversity that were integrated with larger ecosystems. Humans and nature were regarded as distinctly incompatible, except among First Nation participants. Meinig (1976) wrote several papers on how people look at landscapes which provide some insights on perceiving change, both natural and human induced, in nature. Meinig suggested that people see the landscape as: habitat, artifacts, systems, problems, wealth, ideology, history, place, and aesthetics. These two works suggest it is important to gauge individual perceptions or definitions of forests. Patel et al. (1999) proposed that people see forests as part of an interconnected system that is “friendly” as it is a refuge or home.

Tarrant and Cordell (2002) examined the influence of four indicators of population diversity (i.e., age, ethnicity, place of residence, and gender) on explaining amenity values of forests, environmental attitudes, and forest value. They assessed wood production (utilitarian value), clean air (life support value), scenic beauty (aesthetic value), and heritage (spiritual

value). Respondents were asked to rank these four values from most important to least important. The data showed that younger participants favored a biocentric orientation to forests and the natural environment.

Saunders, Brooks, and Myers (2006) chose to divide anthropocentrism into egoistic and humanistic categories. Their article referenced and drew from Ajzen's (1991) Theory of Planned Behavior (TPB). TPB argues that people will do what they say they will do. For example, if people say they will vote in a specific way, they are likely to do so. Or, if they indicate that they plan to protect or conserve forests, they will do so. Kals, Schumacher, and Montada (1999) explored emotional affinity toward nature as a motivation for protecting forests which depends heavily on Theory of Reasoned Action (TRA) and TPB. Drawing from a perspective on biophilia offered by Kellert (1997), they suggest “. . . humans possess a biologically based attraction to nature and that their well-being depends, to a great extent, on the relationships with the surrounding natural world. As a result, humans need to affiliate with nature.” Using this perspective of affinity (i.e., emotional affinity) with nature, they explore interest which motivates the seeking of knowledge and the emotional affinity which motivates contact and sensual experience. Considering this, they explored a willingness to commit to and the manifestation of behavior decisions. They found a connection between people's past experiences with nature and their motivation to protect nature.

Shindler and Cramer (1999) presented an interesting perspective on understanding public values and the wicked problems associated with forest management. They, too, involved the TRA and the influence of subjective societal norms and social pressures. While some of the relationships to forests are individually derived and defined, consciously or unconsciously, they observed a tendency among people to identify with groups and reflect the group perspective.

They suggested there are contrasting natural resource paradigms and offer that it is not sufficient to merely ask people what they want. Such studies should have people make tough decisions that weigh costs and benefits associated with forest management decisions. To accomplish this, they call for civil discourse to explore the wicked problems.

In China, Liu, Ouyang, and Miao (2010) conducted surveys considering the New Environmental Paradigm (NEP) to examine highly conflicted protected areas. They suggest that environmental education and community participation can promote proenvironmental attitudes while alleviating conflicts. Similarly, Li, Wang, Liu, & Weng (2010) examined Taiwanese forest values through survey research and found that environmental value orientations (spiritual, utilitarian, etc.) influenced how people think forests should be managed. They also found that people considered the forests public property and associated a range of historical and cultural values with trees and forests beyond ecological importance.

Vining and Tyler (1999) conducted a qualitative study in Indiana to evaluate values, emotions, and desired outcomes reflected in public response to the Hoosier National Forest Management Plan. They suggest that emotions are essential for interpreting and organizing information and that emotions play a role in summarizing complex information. Moreover, they suggest that emotions motivate action and as such reveal value conflicts. Lutts (1992) presented an analysis of the effect of the Disney movie *Bambi* on public perceptions of forests and hunting further demonstrating the sensitive nature of values and emotions as they relate to contentious natural resources issues.

Winter and Lockwood (2003) proposed a natural area value scale (NAV) to distinguish between and gauge the relative strengths of individual intrinsic, non-use values of nature. They identified three principal factors in their scale: non-use; use (non-recreation); and recreation.

Several authors reported on scales considering the importance of nature or specific forests to people. These generally had two primary constructs: anthropocentric and biocentric (Manning, Valliere, & Minter, 1999; Vaske, Donnelly, Williams, & Jonker, 2001). Manning et al. (1999) also looked at national forests (i.e., Green Mountains National Forest) relative to a range of forest values. The items they explored were one-dimensional and included anthropocentric and biocentric items. Tarrant and Cordell (2002) suggested a scale to measure public values of forests (PVF). They noted “. . . recent empirical studies support a relative decline in the importance assigned to economic forest values among the general public and a concomitant increase in noneconomic values, especially ecosystem protection and amenities.” This study found respondents valued the role forests could have in protecting ecosystems.

Following their hypothesis that environmental values develop from a sense of connectivity with nature, Dutcher, Finley, Luloff, and Johnson (2007) surveyed Pennsylvania landowners to examine the extent to which connectivity to nature may predict and illuminate environmental concern and behavior. Through multiple regression models, they found that those reporting a high level of connectivity with nature did maintain a significant, positive relationship to environmental concern and environmental behavior.

Beyond those mentioned above, a diverse collection of studies from many disciplines describes ways in which trees and forests affect and are affected by people. Cultural aspects relating to trees and forests, and ranging from traditional knowledge systems, to those associated with ethnicity, to different uses within groups have been documented (Allison, 1992; Chavez, 1993; Emery & Pierce, 2005; Flood, 2007; Gordon, Barton, & Adams, 2013; Hamilton, 2012; Johnson, Bowker, Green, & Cordell, 2007; Leatherberry, 2000; MEA, 2005; Mitchell & Hobby, 2010; Murphy, Chretien, & Brown, 2012; O’Brien & Njambi, 2012; Parker & McDonough,

1999; Roberts & Chitewere, 2011; Taylor, 2002; UNEP, 2007;). Social relations and forests have been studied as well in relation to maple syrup production, occupational communities, knowledge systems, and informal social institutions (Carroll, Lee, & McLain, 2005; Richard & Burns, 1999; Whitney & Upmeyer, 2004). The sense of place literature provides examples of research demonstrating how people attach meaning to particular trees and/or forested areas (Chiesura, 2004; Gustafson, 2001; Jorgensen & Stedman, 2001; Kil, Holland, & Stein, 2013; Lewicka, 2011; Perkins, 2010; Spartz & Shaw, 2011; Tuan, 1979; Williams & Vaske, 2003).

Though the dominant, modern western view of nature has been to see forests as secular landscapes, there are notable studies that discuss the spiritual values of forests that can be organized in four categories: forests as intrinsically sacred places (Castleden, Garvin, & Nation, 2009; Glowacka, Washburn, & Richland, 2009; LaVelle, 2001; Pemberton, 1985), forests as the loci of significant spiritual history or culture (Votrin, 2005), forests as a reflection of a higher power, and forests as a place to commune with a higher power and/or experience transcendence (Kamitsis & Francis, 2013; Leatherberry, 2000; Swearer, 1998; Trigger & Mulcock, 2005).

Phenomena dealing with development, cognition, and contact with nature and forests are explored in a large set of diverse studies relating this context to quality of life issues (Bratman, 2012; Hammitt, 2000; Heerwagen & Orians, 1993; Kaplan & Kaplan, 1989; Kellert, 1984; Kellert, 1996; Kellert, 2012; Nakau et al., 2013; Orians, 1980; Orians, 1986; Quantz, 1897; Shin, Shin, & Yeoun, 2012; Tyrväinen et al., 2012; Ulrich, 1993; Ulrich et al., 1991a; Ulrich, Dimbeg, & Driver, 1991b; Van Wieran & Kellert, 2013). The importance of the aesthetic value of trees and forests is documented in studies linking preferences to a biological underpinning or a cognitive desire for diversity, patterns, and complexity (Carroll, 2007; Dandy & Van Der Wal, 2011; Hauru, Koskinen, Kotze, & Lehvävirta, 2014; Kaplan 1987; Kovacs, LeRoy, Fischer,

Lubarsky, & Burke, 2006; Rolston, 1998). A multitude of studies on the importance of recreational forest use and the contribution to personal benefits exist as well (Bradley, 2011; Brown, 1984; Driver, 1996; Driver, Nash, & Haas, 1987; Driver, Brown, & Peterson, 1991; Duerdan, Taniguchi, & Widmer, 2012; Kaplan & Talbot, 1983; Manfredo & Driver, 1996; Norton, 2010; Norton et al., 2014; Shellman, 2014; Stein & Anderson, 2002; Van Wieren & Kellert, 2013; White & Hendee, 2000; Young & Crandall, 1984).

This review outlines diverse literature spanning the natural and social sciences to provide a foundation for understanding the breadth of ways that trees and forests are important to people. There are multiple ways that people, both individually and as groups, utilize and value the many benefits derived from forests. The literature documents the benefits more frequently discussed among forestry professionals including environmental and biological values, economic values, recreational values, and the important products provided by trees and forests. It also illustrates the ways in which people interact with trees and forests that provide a difficult to define special meaning. An understanding of the various ways that trees and forests are valued by people helps to inform and create policy that better reflects people's perceptions and preferences.

Studying diverse populations:

The diverse literature reviewed above shows that there are a variety of ways in which people use and attach meaning to trees and forests. Few studies address the various ways that trees and forests are important representing racially diverse voices. Most of the literature represents voices of white, educated males, and is lacking in data collected from racial and ethnic minorities and women. Trees provide a broad range of benefits to communities and may be utilized or considered important (or unimportant) for different reasons (Donovan & Mills, 2014;

Flocks, Escobedo, Wade, Varela, & Wald, 2011; Jennings, Johnson Gaither, & Schulerbrandt Gragg, 2012; Poe, McLain, Emery, & Hurley, 2013). Research conducted with diverse populations is necessary to broaden an understanding of how trees and forests are perceived to be important in order to provide a useful contribution to policy development.

Environmental sustainability should serve the community as a whole, with a conscious effort to address the social inequalities that often divide our communities (Pearsall & Pierce, 2010; Warner, 2002). Environmental justice scholars emphasize the importance of including multiple perspectives in research about natural resources with special attention given to the structural inequalities that impact perspectives (Berland, Schwarz, Herrmann, & Hopton, 2015; Donovan & Mills, 2014). There is a lack of relevant literature within the field of natural resource management on successful ways to study racially and ethnically diverse populations. Other academic disciplines have pursued various techniques to study traditionally underrepresented audiences.

Racial and ethnic minorities respond differently to research recruitment attempts (McLean & Campbell, 2003). Recruitment of minority participants (racial/ethnic and women) has been documented in health and medical studies. Yancey, Ortega, and Kumanyika (2006) examined 95 studies published between 1999 and 2005 that suggested effective recruitment strategies for underserved populations. These included: strong sampling approach/identification of targeted participants, community involvement/nature and timing of contact, incentives and logistical issues, and cultural adaptations. Feldman, Radermacher, Browning, Bird, and Thomas (2008) identified three recruitment methods to increase participation in research studies with diverse and underrepresented groups: identifying and working with key informants, using bilingual interviewers, and supporting research partners in recruitment activities. Flexibility is

necessary as these populations are traditionally more difficult to recruit and employing different strategies may be necessary.

Effective methods for teaching computer literacy to underserved audiences included using a mobile computer lab brought into communities of interest. Participants were more open to the experience when it occurred in their “backyard” (Tronstad, Teegerstrom, & Osgood, 2004). Reed, Foley, Hatch, and Mutran (2003) used a community church-based strategy to develop trust and recruit older African Americans to participate in survey research. Garber and Arnold (2006) suggested that in the medical field, the researcher would be more effective at recruiting racial minority participants if s/he focused the study around what the minority community wants from the research. Parker and McDonough (1999) tailored a sampling strategy to elicit survey responses from African Americans who traditionally have low survey response rates, resulting in a 52% response rate. Satterfield (2001) used a variety of non-traditional methods to solicit environmental values. She then suggested a few alternatives in methodology, one being to construct surveys using ‘ordinary talk’ or narrative passages instead of conventional belief statements.

The literature describing social science research methods for use with racial and ethnic minority populations is sparse. It does reiterate the importance of using alternative methods to increase participant diversity. Studies examining forest values among racial and ethnic minority populations do exist (Allison, 1992; Chavez, 1993; Flood, 2007; Johnson et al., 2007; Leatherberry, 2000; Parker & McDonough, 1999; Swearer, 1998; Taylor, Kuo, & Sullivan, 2002). Relatively speaking, there are very few studies on trees and forests that have included racially and ethnically diverse perspectives and none of them have accomplished this at the national level or over time. In order to successfully include diverse citizens in forest policy

research, it is necessary to approach the study of how trees and forests are important to people with a research methodology that considers issues of justice and fairness. One way to achieve this is through feminist-inspired mixed methods research.

Feminist Methodology:

Feminist scholars focus on the problems of representation and interpretation of people and groups that are traditionally isolated from cultural, political, and economic power (Kirsch, 1999). In response to the positivist paradigm, feminist principles of research include a focus on reflexivity (Fonow & Cook, 1991; Kirsch, 1999; Reinharz, 1992), a commitment to balancing the inequalities in research, conducting ethical research that is also emancipatory, an understanding that science is not value-neutral, and a multiplicity of research methods (Fonow & Cook, 1991; Harding, 1991; Harding, 2001; Jayarantne & Stewart, 1991; Kirsch, 1999; Reinharz, 1992). There is no one single feminist research method protocol; rather, most feminist researchers focus on the methods most suitable to address the research question (Fonow & Cook, 1991; Jayarantne & Stewart, 1991; Reinharz, 1992). Utilizing mixed methods is powerful for thoroughness in research and addressing inequalities as different people respond to different research recruitment strategies (Hodgkin, 2008; Nightingale, 2003; Reinharz, 1992).

Feminist epistemology and the alternative research paradigm known as pragmatism have inspired the methodology used in the research reported here. These scientific worldviews combine the methods from qualitative and quantitative worlds to produce mixed methods research (Creswell, 2009; Fonow & Cook, 1991; Jayarantne & Stewart, 1991; Johnson et al., 2007; Reinstein, 1992; Tashakkori & Teddlie, 1998; Teddlie & Yu, 2007). Mixed methods research is focused on developing the methods that best answer important research questions.

Pragmatism is especially helpful for the production of “socially useful knowledge” (Feilzer, 2010, p.6-7), in this case, measuring the importance of forests to people. The strength lies in the combination of methods. Pragmatists and feminist researchers acknowledge that power and privilege determine which (or whose) reality will be prioritized in a research context (Hodgkin, 2008; Kirsch, 1999; Mertens, 2007).

In mixed methods research, it is acceptable to strategically use different kinds of sampling (Hodgkin, 2008; Jayarantne & Stewart, 1991; Tashakkori & Teddlie, 1998). Often, researchers will mix probability sampling with purposive sampling. “There is no single type of sample, or no sampling procedure, that is suitable for all research questions/objectives” (Tashakkori & Teddlie, 1998, p.74). Pragmatists and feminist researchers posit that sampling should be based more on the nature of the question.

The traditional survey methodology is challenged by the continued decline in response rates in affluent countries like the U.S. (Groves & Peytcheva, 2008). Also, urbanicity shows an effect on response as response rates tend to be lower in urban areas. This is especially relevant for the research reported here because there is also a relationship between where racial and ethnic minorities live and urbanicity. Racial and ethnic minorities tend to have lower response rates but this can be changed if the material is focused on minority subcultures (Groves & Peytcheva, 2008).

Researchers can utilize a mixed-modal survey for collecting data when it is difficult to achieve the desired responses through one mode alone. For the purposes of this research, the focus is collecting responses from traditionally under-represented groups, including racial and ethnic minorities and women. Traditional mail surveys continue to encounter challenges as people face endless piles of junk mail and survey solicitations, busy lives, and phone solicitations

(Dillman, Smyth, & Christian, 2009a; Dillman et al., 2009b). Switching to another survey data collection mode is an effective way to increase response rate and achieve a representative sample (Dillman et al., 2009b; de Leeuw, Hox, & Dillman, 2008).

Problem statement:

An abundance of literature is available on the different ways that people use and value trees and forests. The literature suggests those participating in forestry research are mostly middle- to senior-aged, college-educated, white males, resulting in data that do not accurately represent the diversity of people living in the U.S. Though many natural resource professionals generally interpret this phenomenon to a lack of interest from those that do not participate, research indicates that people do not participate because of the lack of opportunity and access. Low participation may instead be the result of utilizing research methodologies that are not compatible with diverse participants.

As the U.S. moves toward a more inclusive decision-making process to fulfill the goals of sustainable forest management, action is needed to address the lack of diverse representation in forestry research. Studies suggest that the U.S. population will continue to diversify in the coming decades, making it imperative that racial minorities and women are included in forestry research that has the potential to effect policy and decision-making. Understanding perceptions from the diversity of people is vital because perceptions may influence opinions and acceptability of every aspect of forest management. This study attempts to address the issue of the under-representation of racial minorities and women in forestry research by using a feminist-inspired mixed methods research methodology. The mixing of survey sampling and data

collection modes are tested to assess for sample representativeness, and data are analyzed for differences by race and gender.

Preliminary research:

The first step in examining the importance of trees and forests to people in the U.S. was exploratory and involved conducting 26 focus groups with different demographic populations (USDA Forest Service, 2011). The focus groups uncovered a wide range of values grounding the importance of forests as well as descriptions of changes in interactions with trees and forests over time and negative feelings and concerns people had about trees and forests. The method targeted and successfully engaged diverse populations, including those who are less likely to respond to traditional mail surveys such as African Americans, Asian Americans, Hispanic Americans/Latinos, and Native Americans (Feldman et al., 2008; McLean & Campbell 2003; Tronstad et al., 2004; Yancey et al., 2006). However, focus groups are time consuming, and do not provide the survey-type data favored, for better or worse, by policy- and decision-makers.

Focus group data illustrated the majority of the ways that trees and forests are important similar to those identified in the literature review. The focus group methodology greatly increased the diversity of research participants and identified important differences and nuances. Focus group participants in multiple regions of the U.S., representing many different ethnic/cultural backgrounds, discussed the importance of trees and forests in terms of environmental services, cultural values, recreation, forest products (timber and non-timber), education, economic values, and in ways related to sense of place, spirituality, and health and well-being. The focus groups provided realistic data and captured distinctions based on race, location (urban vs. rural), age, and more. Some differences uncovered by the focus groups

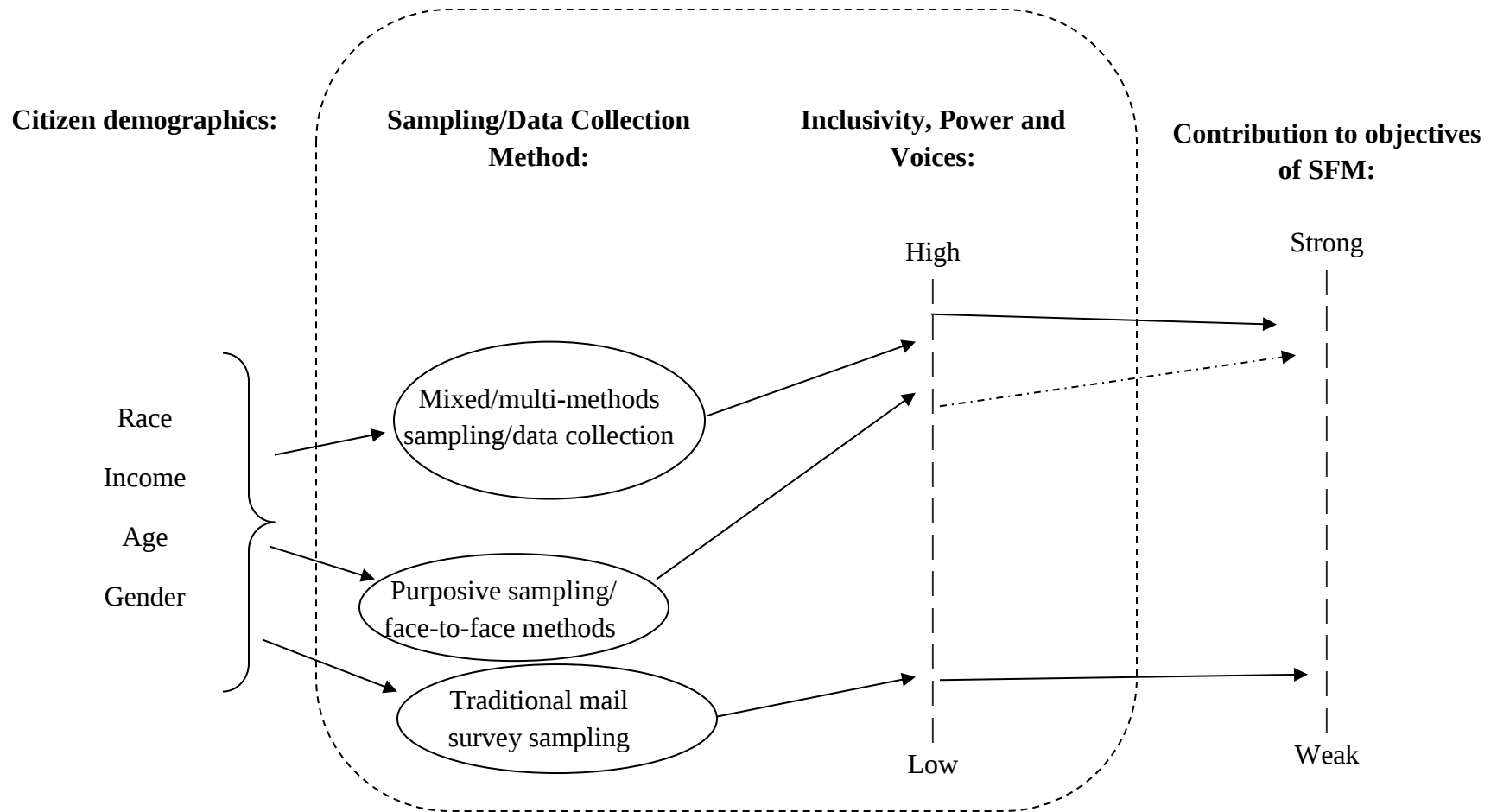
include: feelings of exclusion and fear associated with forests among African Americans; rural respondents exhibiting greater concern with forest degradation, policy and management issues while urban respondents were more likely to show concern for damage to their home and the quality of local parks and street trees; and, younger respondents regularly interacted with forests while older respondents expressed greater appreciation for aesthetics, such as viewing trees from their windows. In addition, responses suggested that these values are not static and through the focus group discussions it was possible to explore how perceptions of trees and forests have changed over time for these diverse groups of people (USDA Forest Service, 2011).

Conceptual Framework:

The conceptual framework (Figure 1) for this study is focused on the sampling, methods, and data collection approach to examine the importance of trees and forests to people. Inclusivity in sampling is critical. Beginning on the left, the first column assumes that people from all demographic categories in the study area are included in the sampling frame. Moving to the second column there is a choice for sampling and data collection methods including traditional survey sampling, purposive sampling and face-to-face methods, and mixed or multi-methods of sampling and data collection. However, the choice of sampling and data collection method affects the level of inclusivity, which affects an overall contribution to the goals of SFM. The assumption is that mixing sampling and data collection modes will result in a more inclusive and representative sample which leads to a more diverse and illustrative understanding of the importance of forests to people.

Figure 1: Conceptual framework

(The dotted arrow line signifies that this method has other caveats, such as financial and time constraints, which make it less efficient for measuring the importance of trees and forests at a national level.)



Research questions: (Table 2²):

1. Does the pairing of different survey sampling (including probability and purposive) and data collection strategies result in a representative sample?
 - a. What are the demographic characteristics of the respondents for probability sampling paired with a mail survey data collection?
 - b. What are the demographic characteristics of the respondents for stratified or disproportionate sampling paired with a mail survey data collection?
 - c. What are the demographic characteristics of the respondents for purposive sampling paired with an in-person survey data collection?
2. How are trees and forests perceived to be important by different racial and ethnic groups?
 - a. Are there differences based on racial and ethnic group?
 - b. Are there differences based on gender both within and between races?
 - c. Are there differences based on the different sampling and data collection methods?
3. What study design factors influenced the research participants to participate? Why?

Table 2: Research questions and corresponding variables of interest

Research Question	Variable
1-a	Demographic characteristics (probability sampling, mail survey)
1-b	Demographic characteristics (stratified or disproportionate sampling, mail survey)
1-c	Demographic characteristics (purposive sampling, in-person survey)
2-a	Differences in perceptions (race)
2-b	Differences in perceptions (gender)
2-c	Differences (based on sampling/data collection)
3	Participation influence

² Measured variables for each research question

CHAPTER 3:

METHODS

Introduction:

Following a philosophy inspired by feminist epistemology and pragmatism, this study used a flexible methodology in an attempt to best address the research questions and problem. Sustainable forest management involves understanding how trees and forests are important to people and calls for meaningful dialogue with the diversity of people at all levels of society. In reality, that dialogue currently occurs with a rather homogenous group of people, namely, those that are educated, older, male, and white (McDonough et al., 2003; Smith & McDonough, 2001).

A survey instrument developed from exploratory data on the importance of forests was tested in a midwestern city, administered in three different sampling and data collection combinations. Descriptive statistics, Chi-square, Independent Samples t-test, Analysis of Variance (ANOVA), and a path analytic approach utilizing Multiple Regression models were used to analyze differences in perceptions on the importance of trees and forests. A focus group and semi-structured interviews were used to determine study design factors that influenced survey participation. Details of each step of this research can be found in subsequent sections of this chapter.

Role of researcher and researcher assumptions:

Feminist epistemology serves as the foundation for the research presented here. One tenet of feminist epistemology is the belief that researchers all carry some or many forms of bias, and that there is truly no such thing as value-free, or objective research. Science has a strong historic

white, androcentric bias, and has undervalued the voices, perspectives, and experiences of women, people of color, and other traditionally marginalized societal groups. Science should be emancipatory and more focused on developing an inclusive scientific process, and valuing the many ways, qualitative and quantitative, that data can be collected.

It is the norm in feminist research to acknowledge one's biases. The presented research was conducted by a white, educated, privileged woman with strong personal connections and emotional attachment to trees, forests, and other natural resources. The researcher also serves as an activist and believes that it is one's duty to take action in the witness of injustice. These biases must be considered, along with ethics, when interacting with research participants, in the handling of the data they produce, and in the manner in which the research is represented. One way that feminist researchers attempt to monitor their biases is through critical reflection throughout each step of the research process, which is attempted here. This research assumes that a traditional survey research methodology will not achieve a representative sample. A representative sample may be attained by using a mix of sampling and data collection methods.

Description of study area:

Due to its diverse population and proximity to the research institution, the city of Lansing, Michigan served as the study area (Figure 2). With a population of approximately 115,000 people, the city of Lansing hosts a diversity of families and individuals from different racial/ethnic backgrounds (Table 3), income levels, and education levels, and is also 51.6% female (U.S. Census, 2013). Lansing provided a research site with opportunities to include racial and ethnic minorities as it comparatively has a larger proportion of non-whites than Ingham County (where it is located), Michigan, and the United States. The city focus also allowed for

sampling down to the census block level rather than the tract, thus allowing for more concentrated sampling frames. The population of Lansing does not represent the U.S. in its totality, but it provided a starting point to test the effectiveness of sampling techniques and a survey measuring the importance of trees and forests to people across diverse populations. Lansing also has a variety of municipal parks and tree lined streets providing natural spaces for its residents.

Figure 2: Map of study site: Lansing, MI

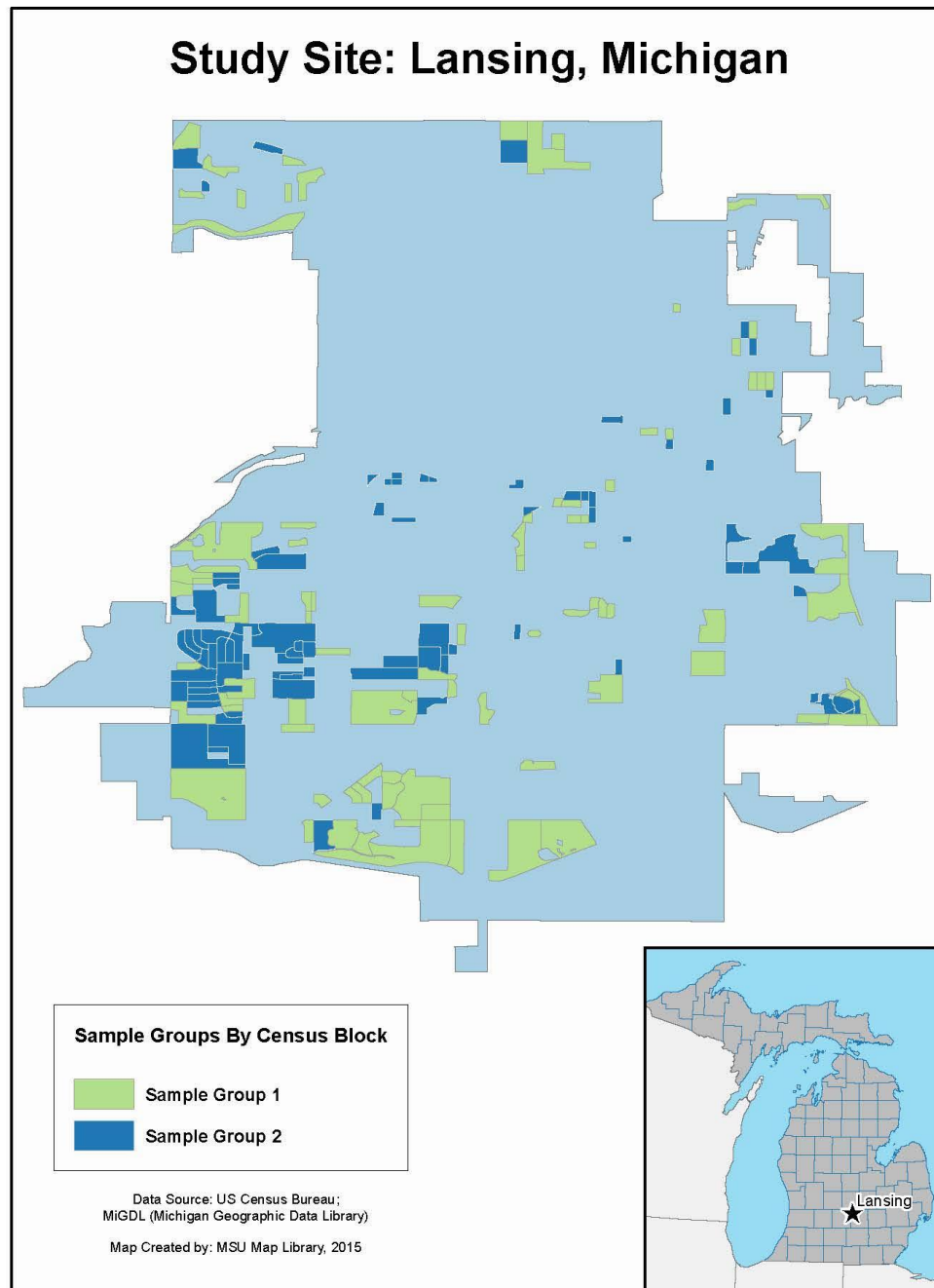


Table 3: Racial composition of Lansing, MI, MI and U.S, 2013

Race	Lansing, MI Percentage*	Michigan Percentage**	United States percentage***
White/Caucasian	61.2%	78.9%	77.7%
Black/African American	23.7%	14.2%	13.2%
American Indian	0.8%	0.6%	1.2%
Asian	3.7%	2.3%	5.3%
Hawaiian and other Pacific Islander	Z	Z	0.2%
Other	4.4%	1.9%	Z
Two or more races	6.2%	2.1%	2.4%
Total	100%	100%	~100%

*Hispanic/Latino origin: 12.5%, White persons non-Hispanic: 55.5%
(2013 U.S. Census Bureau)

** Hispanic/Latino origin: 4.4%, White persons non-Hispanic: 76.6%
(2013 U.S. Census Bureau)

*** Hispanic/Latino origin: 17.1%, White persons non-Hispanic: 62.6%
(2013 U.S. Census Bureau)

Z=greater than zero but less than unit of measurement

Sampling and Participant Selection:

The two goals of this research were to collect data on and analyze differences in perceptions of the importance of trees and forests to people, and to provide data that are representative of the study population. This required careful sampling techniques and a consideration of the appropriateness of sampling approaches for the various demographic groups. One size generally does not fit all.

A representative sample is defined as one that accurately reflects the population that is being sampled, or closely approximates the same collective characteristics of the sampled population (Babbie, 2005). The greater the representativeness of a sample, the more likely that the study has external population validity (Tashakkori & Teddlie, 1998). Many social scientists will argue that a population sample can only be considered representative if probability sampling

is used, giving each person in the population an equal chance of being selected. Probability sampling is used to avoid bias, and can enhance representativeness. But samples rarely, if ever, perfectly represent the populations from which they are selected (Babbie, 2005). Survey samples often are especially lacking in their representation of non-white participants.

Representativeness can also be influenced by the sample size. Sampling error can be reduced by increasing the sample size. Sample size does not guarantee representativeness, especially when considering inclusivity. Error may be reduced by decreasing the homogeneity of population elements, or increasing diversity. Subpopulations may also be sampled disproportionately to ensure sufficient representation for analysis. This involves giving a subpopulation a disproportionately better chance of selection than those located in categories and then allows for samples to be analyzed separately or comparatively (Babbie, 2005).

Considering the above factors, probability sampling was combined with disproportionate sampling to solicit participation from racial/ethnic minorities and women. Additionally, purposive sampling was used to increase the sample size, assuming lower response from subpopulations. The pairing of different sampling and data collection strategies was used strategically with the goal to develop a representative sample from which to study the importance of trees and forests to people. A sample that combines elements from both purposive and probability sampling is likely to produce population external validity, or transferability (Tashakkori & Teddlie, 1998; Teddlie & Yu, 2007). If researchers can collect quantitative data from audiences who generally do not respond to surveys, the research has the ability to make visible the traditionally invisible on a large scale (DeVault, 1999; Jayarantne & Stewart, 1991). Census blocks served as the initial sampling frame. There are approximately 1400 census blocks in Lansing. Specific criteria were then used to determine which census blocks were to be

included in the actual sampling frame. For example, blocks had to contain a certain number of addresses for inclusion.

To address research questions 1a and 1b (Table 2), using the census blocks, address-based sampling occurred in one of two ways utilizing a Delivery Sequence File (DSF). The DSF is an electronic file which contains all deliverable addresses serviced by the USPS, though the addresses are not always associated with names (Dillman et al., 2009a). Recent studies have found address-based sampling using DSF to produce higher response rates, though an overrepresentation of non-Hispanic whites is still documented (Dillman et al., 2009a; Link, Battaglia, Frankel, Osborn, & Mokdad, 2008). A DSF that contained names and phone numbers if available was purchased. About 44% of the addresses also had phone numbers, and approximately 90% had names attached. The file was purchased from Marketing Systems Group (MSG). Several studies found MSG to have reliable address lists (DiSogra, Dennis, & Fahimi, 2010; Iannacchione, 2011). The address lists provided by MSG are updated monthly for accuracy.

Sample Group 1:

To address research question 1a³ (Table 2), 100 census blocks were randomly chosen from a sample stratified by population density. Using Statistical Package for the Social Sciences (SPSS), the 1400 census blocks were first ranked by population size. Those containing less than 15 persons were eliminated from the sample to ensure that there were at least five houses in the census blocks. Then, using Microsoft Excel, the remaining census blocks were ranked based on cumulative population in order to ensure that census blocks with varying population sizes had the

³ What are the demographic characteristics of the respondents for probability sampling paired with a mail survey data collection?

same chance at being chosen for the sample. Using www.randomizer.org, 100 blocks were then drawn (Figure 2). From this sample, five addresses were randomly chosen from each of the 100 census blocks (Table 4).

Sample Group 2:

To increase response rate, some researchers have oversampled difficult to reach populations (i.e., racial minorities, when conducting survey research) (Morrissey & Manning, 2000; Parker & McDonough, 1999). The second sampling method utilized disproportionate sampling following the same format as the first group mentioned above. To address research question 1b⁴, all remaining census blocks with 50% or greater presence of “non-whites” were included in the sampling frame. Those blocks containing less than 15 persons were eliminated from the sample to ensure that there were at least five houses in the census blocks. Then, using Microsoft Excel, the remaining census blocks were ranked based on cumulative population in order to ensure that census blocks with varying populations had the same chance at being chosen for the sample. Using www.randomizer.org, 100 additional blocks were drawn (Figure 2). From this sample, five addresses were randomly chosen from each of the 100 census blocks (Table 4).

Sample Group 3:

Continuing to use the same survey sampling methods because of comfort and familiarity can be dangerous as it likely poses a limited view of the studied phenomenon (Knap & Propst, 2001). It has been documented across many disciplines that racial and ethnic minorities and women respond better with more personal data collection methods, such as face-to-face

⁴ What are the demographic characteristics of the respondents for stratified or disproportionate sampling paired with a mail survey data collection?

interviews or focus groups. Despite this, researchers continue to try and collect information from underrepresented audiences using telephone and mail surveys despite evidence that response rates remain low. Even in instances where response rates are higher, there is sure to be a response bias, whether based on misrepresentation of the population, or the difference between those who choose to respond and those who choose to not respond (Stoop, 2004).

Knowing that underrepresented groups feel more comfortable with face-to-face data collection methods, the third approach to sampling (addressing research question 1c⁵) was more purposive in nature, and one that decreased the distance between the researcher and the researched. It was hypothesized that the address-based sampling would yield low response rates for underrepresented groups and a non-representative sample. In areas near the 200 chosen census blocks, the researcher made contact with different interest groups (i.e., community groups, clubs, churches, neighborhood organizations) and brought the survey instrument directly to the people (approximately 50 surveys per interest group) (Table 4).

Table 4: Sampling methods

Sample	Number of Census Blocks	Attempted Number of Surveys
Random, Address-based	100	500
Disproportionate, Address-based	100	500
Purposive, In-person	n/a	n/a
Total	200	1000+

⁵ What are the demographic characteristics of the respondents for purposive sampling paired with an in-person survey data collection?

It may seem fitting to have explored a fourth sampling method using the face-to-face data collection with probability sampling in the spirit of comparing the different methods. Due to the salience of the research, the time and labor commitment, and the tendency for probability sampling in a public place to not be representative, it was unrealistic to expect any significant contribution from this additional method, and thus it was not explored.

Even with a high quality address list, several addresses were unusable (either returned as “no one at this address” or refusal to participate, mostly the former). This resulted in 459 usable addresses in the random sample, and 449 usable addresses in the disproportionate sample. Of the attempted and delivered surveys, a total of 287 were completed: 124 from the random sample, 103 from the disproportionate sample, and 60 delivered and collected in person in the purposive sample (Table 5).

Table 5: Attempted and obtained surveys

Test method	Attempted number of surveys	Usable addresses	Obtained number of surveys
Address-based random sampling/ Mail survey	500	458	124 (27% response)
Address-based disproportionate sampling/ Mail survey	500	448	103 (23% response)
Purposive sampling/ In-person survey	n/a	n/a	60
Total	1000+	932	n=287

Metrics:

A comprehensive list of values associated with the importance of forests was developed from the focus group data (Table 6) and the reviewed literature. Grouped by relevance to the value categories, over 150 statements were extracted from the focus group data and used to form

survey questions. Value statements were reviewed carefully to reduce the quantity resulting in 70 statements that were simple and easy to understand, with three or more statements clustered together to measure one factor. This resulted in the design of a survey instrument (Appendix I) to test if the statements measure the forest values that are important to people (validity test). The survey instrument also asked questions about participant demographic characteristics in order to better understand the sample.

Table 6: Value categories developed from focus group and literature review

Value category
Environmental & biological values
Social & cultural values
Forest products
Recreation benefits
Sense of place
Health and well-being
Aesthetic values
Spiritual & religious values
Economic values
Educational values
Concerns for trees & forests
Interactions with trees & forests
Negative feelings associated with trees & forests

Likert scales assessed the degree of agreement or disagreement with the value statements in reference to how trees and forests are important (Babbie, 2005). Likert scales provide the ability to ask about several diverse items (Alreck & Settle, 2004; Babbie, 2005) which aligns well with this study because of the range of ways that trees and forests are important to people. Experts recommend the use of both positive and negative statements in Likert scales which was exercised in this study (Dillman et al., 2009a).

Once the research instrument was developed, the value statements were pre-tested across different groups before data collection. Pre-test groups consisted of college students and Michigan citizens unaffiliated with the research. Twenty people of varying ages, racial/ethnic identity, and genders participated in the pre-test (Table 7). Survey items were revised based on feedback from pre-test participants.

Table 7: Description of pre-test sample (n = 20)

	Gender	Race/Ethnicity	Age
Undergraduate students n = 4	Female = 2 Male = 2	White = 3 Other = 1	18 - 21
Graduate students n = 3	Female = 2 Male = 1	White = 1 African American = 2	25 - 38
Michigan residents n = 13	Female = 7 Male = 6	White = 6 African American = 4 Other = 3	27 - 71

Survey Data Collection:

The survey data collection further addressed the first⁶ and second⁷ research questions. Data were collected using a mixed-modal self-administered questionnaire. Following the “Tailored Design Method” (Dillman et al., 2009a) a pre-notice letter was first sent to all addresses in the sample (Appendix II). Multiple motivational features were utilized in an attempt to increase participation from traditionally under-represented groups. The survey and informational materials targeted the specific receiving community. Inner city residents received

⁶ Does the pairing of different survey sampling (including probability and purposive) and data collection strategies result in a representative sample?

⁷ How are trees and forests perceived to be important by different racial and ethnic groups? a) Are there differences based on racial and ethnic group? b) Are there differences based on gender both within and between races? c) Are there differences based on the different sampling and data collection methods?

appropriate motivational/advertising features (for example, focused on parks, street trees, and clean air and water).

Dillman and others (2009a) outlined ways to establish trust, increase benefits of participation and decrease costs of participation. They recommend making the task appear important and the survey interesting, providing social validation, supporting group values, making it convenient to respond, using neutral language (avoiding subordinate language), minimizing solicitation of personal information, and making the questionnaire short and simple to complete. Best practices for questioning and administering the survey which considered both clarity and readability were used. Some best practices for question development include: making sure the question applies to the respondent, asking one question at a time, keeping the language simple and familiar while using specific and concrete terms, using as few words as possible, and ensuring the question specifies the response task (Dillman et al., 2009a). This study followed Dillman and others advice to the maximum extent possible given the available resources. All participants were entered into a lottery to win one of four \$25 VISA gift cards.

Focus group and personal interviews:

The third research question⁸ is evaluative and required feedback from willing research participants. As part of the survey instrument, the researcher asked participants if they would be willing to partake in a focus group or short telephone or in-person interview regarding the data collection mode. Due to low response from participants, one focus group, personal interviews, and phone interviews were arranged. After consenting to participate (Appendix III), participants were asked why they decided to take part in the research and about their perceptions of the

⁸ What study design factors influenced the research participants to participate? Why?

particular sampling and data collection mode through which they responded (Table 8, Appendix IV). A total of 11 people participated in the evaluative interview portion of this study. Three participated in the focus group, three were interviewed in person, and five were interviewed by telephone. Four of the participants were male, seven were female. Two of the participants were Black/African American and the rest were White/Caucasian (Table 9). All participants were entered into an additional lottery to win one \$25 VISA gift card.

Table 8: Evaluative interview questions

Did you receive the survey on the importance of trees and forests in the mail or in-person?
What motivated you to complete the survey on the importance of trees and forests?
Were there any aspects of the survey that were especially interesting or relevant to you?
Were there any aspects that were especially disinteresting or irrelevant?
Have you completed other surveys in the past? (In the mail or in-person?)
How do you decide whether or not you will complete a survey?
How can survey research on topics such as the importance of trees and forests be improved? Are there particular methods that you think are more user-friendly than others?
Do you have any “tips” for future research on the importance of trees and forests?

Table 9: Characteristics of focus group/interview participants

	Black/African American	White/Caucasian
Female	2	5
Male	0	4

Data Analysis:

One intention of this study was to collect data from a diverse, racially- and gender-representative sample. The second intention was to examine differences in perceptions of the importance of trees and forests. Data analysis sought to determine value differences and similarities defining the importance of forests to people across the sample. The analysis explored which sampling and data collection strategies were effective across sociodemographic variables by both examining the data, and then conducting follow-up focus groups and interviews with willing participants. Analysis further included comparing the different sampling modes: the address-based sampling with oversampling, and the face-to-face sampling, to see if one was more effective at yielding a representative sample than the others, or if they worked in tandem. Differences in the substantive data on the importance of trees and forests based on the different sampling and data collection methods, and if the data differ from that found in the preceding focus group research were also examined.

The evaluative focus group and interviews were analyzed qualitatively by the researcher. Notes and transcripts were read through carefully first to explore emerging ideas. Then the ideas were documented and separated into categorical themes. The notes and transcripts were read through a second time and assigned themes as appropriate.

Addressing survey errors:

The Tailored Design Method focuses on developing survey procedures that work in tandem to motivate different types of people to respond to the survey. This method attempts to minimize multiple sources of survey error including coverage, sampling, measurement, and nonresponse, by customizing survey procedures for particular circumstances such as the topic, sponsor, or type of respondent (Dillman et al., 2009a; de Leeuw et al., 2008). Accordingly, some

people received the survey by USPS mail while others received it in person with an introduction from the researcher.

As discussed in the subsequent chapters, each sampling group contributed differently to survey errors. Low sample representativeness found in sample group 1 increased sampling error and coverage error. Sampling error is understood as the degree to how a sample is limited to describe a population because only some (not all) elements in the population are sampled while coverage error is the discrepancy between the target population and the group of individuals included in the sampling frame (Vaske, 2008; Dillman et al., 2009). Sample group 2 was more representative of Lansing residents, decreasing coverage and sampling errors. However, sample group 2 had less demographic and geographic exposure which tends to increase sampling error and coverage error. A purposive sample paired with an in-person survey, as utilized for sample group 3, increased the likelihood for more sampling and coverage errors as the element of randomness is missing. In this context, the presence of the researcher may have influenced participant response resulting in increasing the likelihood of a measurement error. Measurement error is the extent to which participant's answers are imprecise, inaccurate, or limited in the ability to be compared to answers provided by other participants (Vaske, 2008; Dillman et al., 2009). Collectively the combined sampling methods and survey modes provided a more diverse sample and improved coverage and sampling error with a focus on inclusivity. The goal was to reduce coverage errors by mixing modes (Dillman et al., 2009).

In an attempt to address non-response bias/error, or for differences between survey participants and those in the sample that did not respond (Vaske, 2008; Dillman et al., 2009), two samples of 40 potential participants (non-responders) were chosen from sample group 1 and sample group 2 to be contacted and administered a shortened version of the survey instrument

(Appendix V). Of the 80 potential participants, contact was established with 28 people. Eleven participants agreed to complete the non-response survey. Non-response data were collected by telephone. Of the 11 participants, all were White/Caucasian with the exception of one person who identified as Black/African American, and 7 participants were female (Table 10).

Table 10: Characteristics of nonresponse sample

	Black/African American	White/Caucasian
Female	1	6
Male	0	4

The data from the nonresponse survey, though collected from a much smaller sample, did not differ from results collected in the original survey data collection (see Chapter 4), suggesting low nonresponse error (Vaske, 2008; Dillman et al., 2009). Participants expressed a large percentage of agreement (measured as those responding “agree” or “strongly agree” to Likert items) with all scales except that measuring spiritual importance in which participants expressed 46% agreement (Table 11).

Table 11: Nonresponse percent agreement with importance scales

Importance scale	Percent Agreement
Environment/Ecological function	93.9%
Economic	72.7%
Culture	81.8%
Education	90.9%
Health & well-being	90.9%
Aesthetics	90.9%
Products	90.9%
Sense of place	72.7%
Spiritual	45.5%
Recreation†	100.0%
†Item-level	

CHAPTER 4:

RESULTS AND DISCUSSION

Chapter 4 summarizes and discusses results from the survey questionnaire, focus groups, and interviews. Sections are organized by results for each research question (RQ). The first section describes the demographic characteristics of survey respondents, presents statistically significant differences by sample group, and an explanation of errors. The second section describes the substantive survey data and differences based on race/ethnicity, gender, and sample group. The third section encapsulates the qualitative data collected from focus groups and interviews evaluating the survey methodology. A brief summary of the results concludes the chapter. All statistical analyses were conducted using the software package IBM® SPSS® Statistics, Version 21.

Demographic characteristics of respondents:

A total of 285 Lansing residents completed the survey questionnaire. The sample was 61% female and 39% male. More women than men participated in each sample group. For simplification in the statistical data analysis, race was categorized as White/Caucasian, Black/African American, or Other. The sample consisted of 70% participants identifying as White/Caucasian, 18% identifying as Black/African American, and 12% identifying as a race other than white or black. Sample groups varied in their racial representativeness with groups 2 and 3 having more non-white participants⁹. Participants were from varying educational

⁹ For review, sample group 1 was chosen randomly; sample group 2 was chosen disproportionately random (census blocks with greater than 50% non-white racial minorities); and sample group 3 was purposively chosen (in-person).

backgrounds, though most (82%) had at least some college experience and 34% had a bachelor's degree or higher. Participants reported a variety of income levels with 38% earning up to \$25,000, 30% earning \$25,000 - 50,000, and 32% earning more than \$50,000. All adult age levels were represented, though 52% of participants were 55 years and older. The largest percentage of participants (45%) were employed full-time, 10% were employed part-time, 10% were unemployed, and 35% were retired (Table 12)

RQ 1-A: What are the demographic characteristics of the respondents for probability sampling paired with a mail survey data collection (sample group 1)?

Sample group 1 (randomly sampled) was 59.5% female and 41.5% male for a total of 123 participants. The majority of the group (72%) was White, 13% was Black, and 15% identified as another race. All education levels were represented, with 21% having high school or less, 40% having some college, 22% being a college graduate, and 18% holding a graduate or professional degree. The income levels for sample group 1 were 28% making up to \$25,000, 33% making \$25,000 to \$50,000, and 40% making over \$50,000. All age groups were represented, with 3% being 18-24 years, 12% being 25-34 years, 17% being 35-44 years, 16% being 45-54 years, 29% being 55-64 years, and 24% being 65 and older. The largest percentage of participants (49%) were employed full time, 8% employed part time, 7% were unemployed, and 36% were retired (Table 12).

RQ 1-B: What are the demographic characteristics of the respondents for stratified or disproportionate sampling paired with a mail survey data collection (sample group 2)?

Sample group 2 was 68% female and 32% male for a total of 102 participants. The majority of the group (64%) was White, 21% was Black, and 17% identified as another race. All

education levels were represented, with 12% having high school or less, 45% having some college, 25% being a college graduate, and 18% holding a graduate or professional degree. The income levels for sample group 2 consisted of 34% making up to \$25,000, 35% making \$25,000 to \$50,000, and 32% making over \$50,000. All age groups were represented, with 1% being 18-24 years, 12% being 25-34 years, 17% being 35-44 years, 15% being 45-54 years, 22% being 55-64 years, and 32% being 65 and older. The largest group of participants (46%) were employed full time, 14% employed part time, 4% were unemployed, and 36% were retired (Table 12).

RQ 1-C: What are the demographic characteristics of the respondents for purposive sampling paired with an in-person survey data collection (sample group 3)?

Sample group 3 was 60% female and 36% male for a total of 60 participants. The majority of the group (63%) was White, 20% was Black, and 17% identified as another race. All education levels were represented, with 22% having high school or less, 35% having some college, 26% being a college graduate, and 16% holding a graduate or professional degree. The income levels for sample group 3 were 67% making up to \$25,000, 15% making \$25,000 to \$50,000, and 19% making over \$50,000. All age groups were represented, with 9% being 18-24 years, 25% being 25-34 years, 9% being 35-44 years, 14% being 45-54 years, 28% being 55-64 years, and 16% being 65 and older. The largest group of participants (35%) were employed full time, 9% employed part time, 26% were unemployed, and 31% were retired (Table 12).

Table 12: Demographic characteristics of survey participants

		Combined samples	Sample group 1	Sample group 2	Sample group 3
Gender	Female	60.9%	58.5%	67.8%	60.4%
	Male	39.1%	41.5%	32.2%	36.2%
		n = 285	n = 123	n = 102	n = 60
Race	White	70.1%	71.5%	63.7%	63.3%
	Black	17.5%	13.0%	21.3%	20.0%
	Other	12.4%	15.4%	16.7%	16.7%
Education	High school or less	18.3%	20.7%	12.2%	22.4%
	Some college	40.6%	39.7%	44.9%	35.0%
	College graduate	17.3%	22.3%	24.5%	25.9%
	Grad/professional degree	17.3%	17.6%	18.4%	15.5%
Income	Up to \$25,000	38.30%	28.1%	33.7%	66.7%
	\$25,000 - \$50,000	29.50%	32.5%	34.8%	14.8%
	Over \$50,000	32.20%	39.5%	31.5%	18.5%
Age	18 - 24 years	3.2%	2.5%	1.0%	8.8%
	25 - 34 years	14.3%	11.5%	12.1%	24.6%
	35 - 44 years	15.4%	17.2%	17.2%	8.8%
	45 - 54 years	15.4%	16.4%	15.5%	14.0%
	55 - 64 years	26.3%	28.7%	22.2%	28.1%
	65 and older	25.4%	23.8%	32.3%	15.8%
Employment	Part time	10.4%	8.4%	13.8%	9.1%
	Full time	44.6%	48.7%	45.7%	34.5%
	Unemployed	9.7%	6.7%	4.3%	25.5%
	Retired	35.2%	36.1%	36.2%	30.9%

Because individual sample groups did have varying demographic representation, Chi-square analyses from cross-tabulations were computed for each demographic category.

Statistically significant differences between sample groups were found for the demographic variables employment status and income (Table 13). Sample group 3 had more participants with lower incomes and more participants that were underemployed or unemployed.

Table 13: Demographic differences between sample groups (Chi-square analysis)

Demographic variable	df	Value	<i>p</i>
Gender	2	0.630	0.730
Race/ethnicity	4	2.619	0.623
Education level	6	4.046	0.670
Employment status	6	21.698	0.001*
Income	4	25.196	0.000*

**p* < .01

Discussion of RQ 1 results and survey errors:

One objective of this study was to explore if the pairing of different survey sampling and data collection strategies would result in a racially- and gender-representative sample. A comparison of the demographic characteristics of each sample group provided valuable details about the usefulness of mixing sampling and data collection methods. Sample group 1, which received the survey via traditional methods (probability sampling paired with a mailed survey) provided the least racial representativeness of the three sample groups, as hypothesized. Both sample groups 2 (disproportionately random) and 3 (purposive) provided greater racial and gender representativeness than sample 1. None of the sample groups provided exact representation of the population (this would be very difficult to achieve), but sample groups 2 and 3 increased African American responsiveness by 7 – 8.1 percentage points (21% and 20% respectively) and “all other” racial responsiveness by 1.3 percentage points (17% for both). For context, Lansing is 24% African American and 15% “Other.” This demonstrates the usefulness of mixing survey sampling and data collection methods to elicit a racially representative sample (Table 12) as recommended by Dillman’s Tailored Design (2009a) and many other feminist and pragmatist mixed methods researchers (de Leeuw et al., 2008; Hodgkin, 2008; Jayarantne & Steward, 1991; Nightingale, 2003; Reinharz, 1992; Tashakkori & Teddlie, 1998).

Women were overrepresented in each sample group with the most representation in sample group 2 (Table 12). While the overrepresentation of women may be common in other types of survey research (Curtin, Presser, & Singer, 2000; Moore & Tarnai, 2002; Singer, van Hoewyk, & Maher, 2000), this is not always the case with forestry and natural resources-related research where participants tend to be educated, older, white males (McDonough, Russell, Burban, & Nancarrow, L., 2003; Smith & McDonough, 2001) . Since women are generally under-represented in forestry research and decision-making processes, it is important to note that this methodology was successful at recruiting participation by women. The methodology was inclusive of women's voices.

Other demographic characteristics of survey participants show representation of a variety of educational backgrounds, income levels, age (though most participants were 55 and older), and employment levels. There were significant differences between sample groups based on income level and employment status. This is likely due to the fact that many participants (but not all) in sample group 3 were recruited at community events¹⁰ geared towards lower income persons. Differences in age representation by sample groups, though not statistically significant, are worth noting. While sample groups 1 and 2 had the highest percentage of persons aged 55 and older, sample group 3 had the highest percentage of persons aged 18 - 34 years. This may be due to the community events geared towards low income persons, or, it may signify that younger persons are more likely to complete a survey given in-person instead of received via postal mail (Table 12).

¹⁰ Participants were recruited at local farmers' markets, community food giveaways, and neighborhood center events.

For the purpose of RQ 1, to investigate the potential of achieving a representative sample by mixing survey sampling and data collection modes, this explorative study provided useful results. Borrowing from feminist and pragmatist mixed methods (Hodgkin, 2008; Jayarantne & Stewart, 1991; Nightingale, 2003; Reinharz, 1992; Tashakkori & Teddle, 1998), combining a sample with random, disproportionate, and purposive elements resulted in a more diverse sample of participants. None of the utilized sampling methods were extremely useful for achieving representativeness on their own which reflects earlier studies calling for the use of mixed methods to appropriately answer research questions (Tashakkori & Teddle, 1998).

Survey errors

Sample group 1 was the least representative of Blacks/African Americans resulting in increased sampling error and coverage error (Vaske, 2008; Dillman et al., 2009). Sample group 2 was more representative of Blacks/African Americans, but with less demographic coverage due to the disproportionate sampling in census blocks with 50% or greater nonwhite inhabitants, also increasing sampling error and coverage error (Vaske, 2008; Dillman et al., 2009). Sample group 3 was more representative of Blacks/African Americans, residents from lower income brackets, and unemployed residents but due to the purposive sampling and in-person data collection the element of randomness is missing. For sample group 3, the likelihood of sampling, coverage, and measurement error increased (Vaske, 2008; Dillman et al., 2009), and it is quite time consuming to obtain a large sample for statistical analysis. Collectively the combined sampling methods and survey modes provided a more diverse sample for examining the importance of trees and forests and improved coverage error with a focus on inclusivity. Mixing modes was useful for reducing coverage error while single modes did not sufficiently cover the studied population (Dillman et al., 2009).

Survey data analysis:

Data organization:

The Likert-type items in the survey questionnaire measured responses on a 5-point scale representing “strongly disagree” (SD) to “strongly agree” (SA), allowing an additional answer choice “don’t know” (Figure 3). The decision had to be made regarding how to analyze the data for the “neutral” (N) and “don’t know” (DK) options. First, all analyses were conducted with the categories N and DK combined. All analyses were repeated with the N category left as is, and the DK category coded as missing data. The two groups of analyses were then compared. There were statistically significant differences between analyses conducted as N and DK combined, and DK coded as missing data. For consistency, all analyses discussed in this dissertation are based on the data with the DK category coded as missing. Because there were differences in the analyses, it is not accurate to say that N and DK are similar enough to consider as the same response.

Survey items that had greater than 8% response “DK” were questions that addressed the importance of trees and forests for cleaning and filtering water (19% DK response), the importance of trees and forests for providing fuel (12% DK response), and a question addressing the management of trees and forests (19% DK response). These three questions had a significant amount of responses in the “don’t know” category. It is possible that the question language or phrasing was confusing for people, or, that participants genuinely did not know the answer. If used in future surveys, these questions need to be explored further for clarity and revised or reworded.

Figure 3: Example question from survey (for full survey see Appendix I)

The fifth question is asking about the ways in which trees and forests influence human health and a sense of well-being. Please describe the extent to which you agree or disagree with the following statements.

Question 5

	1	2	3	4	5	6
	Strongly Disagree		Neutral		Strongly Agree	Don't Know
1. Trees and forests are relaxing	☐	☐	☐	☐	☐	☐
2. Trees and forests provide a place for privacy/solitude	☐	☐	☐	☐	☐	☐
3. Trees and forests provide a place for "escape" or to "get away"	☐	☐	☐	☐	☐	☐
3. Trees and forests provide a connection to a Higher Power	☐	☐	☐	☐	☐	☐

Assessing reliability:

The survey questionnaire presented Likert-type items organized by category of importance including: environmental/ecological function, economic, culture, education, health and well-being, aesthetics, products, sense of place, and spiritual importance. One item asked about the recreational importance of trees and forests. Additionally, categories related to interactions people had with trees and forests, and concerns and negative feelings people had for trees and forests were included in the survey. Scales were created by computing the mean responses for each category of questions.

To assess reliability, or internal consistency in item responses, Cronbach's alpha coefficient was computed for each scale of importance. The closer the alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. It is commonly accepted in the social sciences that an alpha coefficient greater than 0.70 is acceptable, greater than 0.80 is good,

and greater than 0.90 is excellent (George and Mallery, 2003). For this study, all but two of the scales had good or excellent alpha coefficients for reliability. Two scales had questionable alpha coefficients: those measuring economic importance ($\alpha = 0.69$) and negative feelings ($\alpha = 0.64$) (Table 14).

Discussion of scale reliability:

Overall, the Likert-type items developed into scales were successful at measuring the importance of trees and forests. Two scales from the survey showed questionable reliability via Cronbach's Alpha – those measuring economic importance, and those measuring negative feelings people had towards trees and forests. Cronbach's alpha can give an estimate of internal consistency or the inter-relatedness of items in a scale. Questionable reliability can signify that the questions comprising the scale may not have been measuring that which they were intended to measure (increasing the likelihood of measurement error).

Many participants seemed to be confused about the question measuring negative feelings towards trees and forests. In several instances, participants wrote in the comments section of the mail survey that s/he agreed that there are several negative phenomena that accompany trees and forests but that the positive aspects significantly outweighed the negatives. The evaluative focus group/interviews (reported below) also found similar results in regards to the negative feelings scale. Additionally, this particular scale was the only scale that was mostly negatively correlated with all other scales. If participants agreed with importance scales, they tended to disagree with the negative feelings scale. This is quite interesting because most questions comprising the negative feelings scale were based on realistic scenarios, not questions based on opinion. Questions addressing economic importance and negative feelings towards trees and forests need to be reconsidered and revised in any future studies with this instrument.

RQ 2: How are trees and forests perceived to be important by different racial/ethnic groups?

Percent agreement with importance scales was reported as a measurement combining the percentage of those who chose “agree” and “strongly agree.” Participants were in agreement with most scales of importance (Table 14), and, all scales but one were positively correlated with one another (Table 15). Positive correlations were statistically significant for all scales except that measuring the importance of forest products which was only statistically significantly correlated with environmental/ecological function, economics, and education. The scale measuring negative feelings towards trees and forests was, in most cases, weakly and negatively correlated with all other scales. The scales with the lowest percent agreement were those measuring spiritual importance (49% agreement) and the negative feelings people may have had towards trees and forests (36% agreement) (Table 14).

Discussion of overall importance:

Percent agreement with importance scales along with the finding that scales were positively correlated with one another indicates an overall positive attitude towards trees and forests. The scale measuring spiritual importance showed lower overall agreement than other scales (49%), with responses ranging from strongly disagree to strongly agree. This suggests that the spiritual importance of trees and forests is quite salient for some, and insignificant for others. In the focus group discussions, one participant explained that what another considered a spiritual experience when near trees or forests, he considered *not* related to spirituality, but rather, that which enhances his sense of health and well-being. Both participants seemed to be discussing a

similar feeling, but with different labels. This is reminiscent of literature documenting the human need to affiliate with nature for both spiritual and health reasons related to quality of life (Kamitsis & Francis, 2013; Kaplan, 1995; Kellert, 1985; Kellert, 1997; Kellert, 2012; Nakau et al., 2013; Quantz, 1897; Tyrväinen et al., 2014; and others).

Such overall agreement with importance scales underscores that trees and forests are valued for many reasons, as discussed in the literature. The data addressed benefits more frequently discussed among forestry professionals including environmental and ecological function, economic importance, recreational use, and the important products provided by trees and forests. The data also show that people interact with trees and forests in ways that provide a special meaning that is not easily defined. Trees and forests help contribute to one's sense of health and well-being including spiritual and religious feelings. Trees and forests are valued for their beauty. They also seem to play an important role in human cognitive development and education. A deeper understanding of the many ways that trees and forests are important to people can be used to inform and create policy that better reflects people's perceptions and preferences.

Table 14: Reliability and percent agreement for importance scales

Importance factor	Size	Min	Max	SD	Mean	Cronbach's Alpha	Items per scale	Percent Agreement*
Environment/Ecological Function	285	2.7	5	0.4	4.7	0.91	12	89.0%
Economic	283	2	5	0.6	4.5	0.69	3	85.1%
Culture	283	2.7	5	0.6	4.4	0.81	3	83.3%
Education	285	2.3	5	0.5	4.7	0.85	3	91.7%
Health & well-being	285	2.7	5	0.5	4.7	0.86	3	93.3%
Aesthetics	285	2.3	5	0.4	4.9	0.89	3	97.3%
Products	282	1	5	0.8	4.4	0.83	3	80.9%
Sense of place	281	1	5	0.8	4.2	0.87	5	72.3%
Spiritual	276	1	5	1.1	3.6	0.84	3	48.5%
Recreation†	285	2	5	0.6	4.7	n/a	1	93.9%
Interactions	284	1.8	5	0.7	4.1	0.84	10	73.3%
Concerns	281	1	5	0.8	4.3	0.92	6	77.8%
Negative feelings	281	1.4	5	0.6	2.9	0.64	9	36.1%

* Measures the combined percentage of those that chose “agree” or “strongly agree”

†Item-level

Table 15: Pearson correlation matrix for importance scales/item

	EF	EC	CU	ED	HW	AE	PR	SOP	SP	RE	IN	CO
Environment/ Ecological Function (EF)	1.0											
Economics (EC)	.43**	1.0										
Culture (CU)	.51**	.50**	1.0									
Education (ED)	.55**	.38**	.68**	1.0								
Health & well-being (HW)	.50**	.39**	.50**	.49**	1.0							
Aesthetics (AE)	.42**	.41**	.46**	.44**	.63**	1.0						
Products (PR)	.12*	.19**	0.08	.12*	0.03	0.11	1.0					
Sense of Place (SOP)	.45**	.42**	.57**	.54**	.39**	.45**	0.08	1.0				
Spiritual (SP)	.31**	.25**	.46**	.41**	.32**	.27**	.18**	.60**	1.0			
Recreation (RE) †	.47**	.39**	.53**	.58**	.65**	.63**	.11	.38**	.33**	1.0		
Interactions (IN)	.49**	.36**	.56**	.56**	.53**	.49**	.13*	.68**	.56**	.51**	1.0	
Concerns (CO)	.54**	.36**	.46**	.42**	.51**	.45**	0.06	.56**	.46**	.512**	.58**	1.0
Negative feelings (NF)	-.17**	.01	-.11	-.05	-.09	-.01	.12	-.07	-.02	-.07	-.15*	-.10

* $p < .05$, ** $p < .01$, †Item-level

Differences by race/ethnicity:

RQ 2-A Are there differences based on racial/ethnic group?

One-way Analysis of Variance (ANOVA) was conducted to test for differences in perceptions on the importance of trees and forests by race/ethnicity. All ANOVA results were confirmed with the non-parametric equivalent test, Kruskal Wallis, because of the use of Likert-type and non-normally distributed data.

There was a statistically significant difference in perceptions on the environmental/ecological importance of trees and forests for racial/ethnic groups as determined by the one-way ANOVA ($F(2, 271) = 7.608, p = .001$) (Table 16). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly lower mean scores (4.53) for the environmental/ecological function scale than both Whites (4.78) and Others (4.76) (Table 17).

A statistically significant difference between racial/ethnic groups was found for perceptions on the economic importance of trees as determined by the one-way ANOVA ($F(2, 268) = 4.311, p = .014$) (Table 16). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly lower mean scores (4.25) for the economic importance scale than both Whites (4.53) and Others (4.53) (Table 17).

Data from the health and well-being importance scale demonstrated a statistically significant difference between racial/ethnic groups determined by the one-way ANOVA ($F(2, 269) = 5.285, p = .006$) (Table 16). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and

Others. African Americans had slightly lower mean scores (4.52) for the health and well-being importance scale than both Whites (4.78) and Others (4.80) (Table 17).

A statistically significant difference between racial/ethnic groups was found for the sense of place importance scale determined by the one-way ANOVA ($F(2, 266) = 8.282, p = .000$) (Table 16). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly lower mean scores (3.72) for the sense of place importance scale than both Whites (4.21) and Others (4.39) (Table 17).

Another statistically significant difference for racial/ethnic groups was found for perceptions on concerns for trees and forests as determined by the one-way ANOVA ($F(2, 266) = 5.579, p = .004$) (Table 16). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly lower mean scores (3.94) for the concerns scale than both Whites (4.36) and Others (4.44) (Table 17).

It is noteworthy that African Americans did not produce lower mean scores for all importance scales (Table 17). The differences in means scores were only statistically significant for the importance scales mentioned above. Even considering statistical significance, it is important to see that in most cases African American mean scores were still quite favorable, or in agreement with importance scales (falling mostly between “agree” (4) and “strongly agree” (5)).

Table 16: Differences in perceptions of the importance of trees and forests by race/ethnicity (One-way ANOVA)

Importance scale/item	df	SS	MS	F	<i>p</i>
Environment/Ecological Function	2	2.412	1.206	7.608	0.001
Economic	2	2.971	1.485	4.311	0.014
Culture	2	0.747	0.374	0.925	0.398
Education	2	0.495	0.247	0.87	0.42
Health & well-being	2	2.622	1.311	5.284	0.006
Aesthetics	2	0.504	0.252	1.655	0.193
Products	2	1.817	0.909	1.605	0.203
Sense of place	2	10.992	5.496	8.282	0.000
Spiritual	2	6.138	3.069	2.645	0.073
Recreation†	2	0.644	0.322	0.880	0.416
Interactions	2	2.363	1.182	2.777	0.064
Concerns	2	6.949	3.475	5.579	0.004
Negative feelings	2	0.943	0.472	1.236	0.292

†Item level question

Table 17: Descriptive statistics for importance scales by race/ethnicity

Importance scale/item	Race/Ethnicity	N	Mean	Std. Dev.
Environment/Ecological Function	Black/African American	48	4.53	0.505
	White/Caucasian	192	4.78	0.368
	All others	34	4.76	0.395
Economic	Black/African American	46	4.25	0.696
	White/Caucasian	191	4.53	0.562
	All others	34	4.53	0.563
Culture	Black/African American	46	4.40	0.694
	White/Caucasian	190	4.41	0.625
	All others	34	4.56	0.612
Education	Black/African American	47	4.56	0.567
	White/Caucasian	191	4.67	0.509
	All others	34	4.66	0.617
Health & well-being	Black/African American	47	4.53	0.601
	White/Caucasian	191	4.78	0.488
	All others	34	4.80	0.386
Aesthetics	Black/African American	47	4.77	0.417
	White/Caucasian	191	4.87	0.399
	All others	34	4.91	0.288
Products	Black/African American	47	4.59	0.56
	White/Caucasian	189	4.38	0.782
	All others	34	4.46	0.812
Sense of place	Black/African American	46	3.72	0.934
	White/Caucasian	191	4.21	0.782
	All others	32	4.39	0.824
Spiritual	Black/African American	46	3.68	1.26
	White/Caucasian	186	3.48	1.05
	All others	32	3.93	0.957
Recreation†	Black/African American	44	4.61	0.722
	White/Caucasian	190	4.75	0.572
	All others	34	4.74	0.618
Interactions	Black/African American	46	3.92	0.81
	White/Caucasian	192	4.15	0.613
	All others	34	4.22	0.657
Concerns	Black/African American	44	3.94	1.07
	White/Caucasian	191	4.36	0.713
	All others	34	4.44	0.771
Negative feelings	Black/African American	45	3.04	0.771
	White/Caucasian	190	2.93	0.571
	All others	34	2.82	0.644

†Item-level

Weighting is a statistical tool used to account for oversampling and undersampling bias in survey research (Vaske, 2008). Often researchers will use weighting as a substitution for sample representativeness, giving more weight to variables undersampled, and less weight to variables oversampled. Because sample group 1 (SG1) was random with low racial representation and sample group 2 (SG2) was disproportionately random with better racial representation, the data for SG1 were weighted¹¹ and the ANOVA test was repeated. Results for weighted SG1 were compared to results for unweighted SG2. This process explored if weighting data really does result in achieving a higher degree of statistical representativeness. In other words, the process examined if weighting data compensates for the lack of racial representativeness in SG1.

A comparison of ANOVA results for two factors showed differences between the weighted and unweighted data for sample groups 1 and 2 suggesting that weighting data was not successful in compensating for the lack of racial representativeness (Table 18). A comparison of ANOVA results for another factor showed that the statistically significant differences were found for both sample groups 1 and 2 indicating that weighting data may have compensated for a lack of racial representativeness (Table 18). These inconsistent results demonstrate that, in this study, weighting data was only marginally successful in compensating for the lack of racial representativeness.

¹¹ Formula for weighting: Weighted factor = percent in population/percent in sample group

Table 18: Comparing weighted and non-weighted data for racial differences

Factor: Importance scale/item	Weighted sample group 1 F	Sample group 2 F	Full sample F
Environment/Ecological			
Function	0.233	6.525**	7.608**
Economic	3.659*	0.002	4.311*
Culture	0.868	0.808	0.925
Education	0.103	0.331	0.87
Health & well-being	0.187	2.016	5.284**
Aesthetics	1.438	0.603	1.655
Products	2.507	0.716	1.605
Sense of place	4.821**	3.652*	8.282**
Spiritual	2.37	1.563	2.645
Recreation†	0.513	0.397	0.880
Interactions	0.515	1.938	2.777
Concerns	0.241	2.759	5.579**
Negative feelings	0.28	2.579	1.236

* $p < .05$, ** $p < .01$, † = item level

Item-level differences by race/ethnicity:

Previous findings from the focus group study that informed this research prompted item-level analysis of the negative feelings scale. African Americans in the focus group study discussed feeling unwelcome in forested areas or parks, and expressed a safety concern when near trees or forests. Similar results were found for this study.

There was a statistically significant difference in negative feelings for trees and forests for racial/ethnic groups as determined by the one-way ANOVA as follows: For the item “I do not feel welcome in forests or parks”, ($F(2, 259) = 6.459, p = .002$) (Table 19). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly higher mean

scores (2.00) than both Whites (1.43) and Others (1.42). Further statistical significance was found for the item “I have a safety concern when I am near trees or forests”, ($F(2, 263) = 6.566$, $p = .002$) (Table 19). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between Black/African Americans and both White/Caucasians and Others. African Americans had slightly higher mean scores (2.34) than both Whites (1.66) and Others (1.71).

Table 19: Negative feelings item-level racial/ethnic differences, One-way ANOVA

Item	df	SS	MS	F	p
I do not feel welcome in forests or parks	2	12.037	6.019	6.459	0.002
I have a safety concern when I am near trees or forests	2	16.52	8.26	6.566	0.002

Discussion of differences by race/ethnicity:

This study documented significant differences based on race and gender in how people perceive the importance of trees and forests. Whites and “other” racial minorities tended to have slightly higher mean responses than African Americans signifying a higher level of agreement with the scale questions. These differences are of particular significance for several scales. The exceptions to this trend are that African Americans had higher mean scores for the products scale (timber and non-timber forest products) and the negative feelings scale.

Another exception is that whites had the lowest mean scores for the spiritual importance scale with African Americans and all other non-white racial minorities holding the highest mean scores, and this was statistically significant at $p < .10$ (this difference was not highlighted in Table 16). Leatherberry (2000) provided an overview of African American spiritual and historical ties to the forest. Many other studies show the spiritual significance of trees and forests to nonwhite racial groups, mostly Native Americans in particular (Castleden et al., 2009;

Glowacka et al., 2009; LaVelle, 2001; Pemberton, 1985; Swearer, 1998). Differences found here provide an example underscoring the need to sample diverse audiences as the small details sometimes can carry a great weight. Since most forest policy is representing views of older, more affluent, white males (Anthony et al., 2004; Burns et al., 2009; McDonough et al., 2003; Taylor, 2002), the spiritual importance of trees and forests may not be considered a priority for management objectives.

Similarly, special attention is merited for the item-level racial differences found for the negative feelings scale. With higher mean scores than Whites and Others, African Americans expressed feeling unwelcome in forests or parks and having a safety concern when near trees or forests. Though African American mean scores still fall on the “disagree” end of the Likert scale for these questions, there was much more variance in responses than for Whites and Others (Table 17). These results concur with previous focus group findings on the importance of trees and forests, along with literature on the lingering historical effects of racism, slavery, and civil rights (Leatherberry, 2000; Meraji, 2015; Taylor, 2002).

Data show that one size does not fit all, giving even more strength to the argument that diversity in sampling is critical for measuring the importance of trees and forests and understanding the nuances among people groups that may affect forest use. This is especially imperative if data will be used to develop policy affecting all people. Analyses also showed that, for this study in particular, weighting data does not necessarily compensate for lack of racial representativeness.

Differences by gender:

RQ 2-B: Are there differences based on gender both within and between racial/ethnic groups?

Part 1: Gender differences within entire sample:

An Independent Samples t-test was conducted to assess differences in perceptions on the importance of trees and forests by gender. All results were compared with those from the non-parametric equivalent, Mann-Whitney U test, because of the use of Likert-type and non-normally distributed data. For all but two importance scales, women's mean scores were higher than those from men, indicating a higher level of agreement (Table 20). The two exceptions to this include the products scale, and the negative feelings scale. Differences in scores were statistically significant for the following (Tables 20 and 21):

- Environmental/ecological function scale: The difference in scores for females (4.79 ± 0.355) and males (4.67 ± 0.449) was significant with $t(269) = 2.350$, at $p = .019$.
- Cultural scale: The difference in scores for females ($4.52 \pm .569$) and males ($4.33 \pm .685$) was significant with $t(266) = 2.50$, at $p = .013$.
- Education scale: The difference in scores for females ($4.77 \pm .414$) and males ($4.48 \pm .622$) was significant with $t(267) = 4.679$, at $p = .000$.
- Health and well-being scale: The difference in scores for females ($4.82 \pm .411$) and males ($4.67 \pm .551$) was significant with $t(267) = 2.625$, at $p = .009$.
- Aesthetics scale: The difference in scores for females ($4.91 \pm .328$) and males ($4.79 \pm .440$) was significant with $t(267) = 2.463$, at $p = .014$.

- Sense of place scale: The difference in scores for females ($4.24 \pm .784$) and males ($4.02 \pm .846$) was significant with $t(266) = 2.148$, at $p = .033$.
- Spiritual scale: The difference in scores for females (3.72 ± 1.07) and males (3.32 ± 1.09) was significant with $t(261) = 2.943$, at $p = .004$.

Table 20: Descriptive statistics for importance scales by gender

Importance scale	Gender	N	Mean	Std. Dev.
Environment/Ecological function	Female	165	4.79	0.355
	Male	106	4.67	0.449
Economic	Female	161	4.50	0.570
	Male	106	4.48	0.616
Culture	Female	163	4.52	0.569
	Male	105	4.33	0.685
Education	Female	164	4.77	0.414
	Male	105	4.48	0.622
Heath & well-being	Female	163	4.82	0.411
	Male	106	4.67	0.551
Aesthetics	Female	163	4.91	0.328
	Male	106	4.79	0.440
Products	Female	160	4.42	0.783
	Male	106	4.42	0.736
Sense of place	Female	162	4.24	0.784
	Male	106	4.02	0.846
Spiritual	Female	159	3.72	1.074
	Male	104	3.32	1.089
Recreation†	Female	161	4.80	0.459
	Male	104	4.64	0.709
Interactions	Female	163	4.20	0.616
	Male	106	4.05	0.672
Concerns	Female	163	4.34	0.797
	Male	104	4.26	0.804
Negative feelings	Female	162	2.91	0.644
	Male	104	2.97	0.601

†Item-level

Table 21: Differences in perceptions of the importance of trees and forests by gender, Independent Samples t-test

Importance scale	t	df	p
Environment/Ecological function	2.350	269	0.019
Economic	0.200	265	0.842
Culture	2.500	266	0.013
Education	4.679	267	0.000
Heath & well-being	2.625	267	0.009
Aesthetics	2.460	267	0.014
Products	0.060	264	0.952
Sense of place	2.148	266	0.033
Spiritual	2.943	261	0.004
Recreation†	2.189	263	0.029
Interactions	1.927	267	0.055
Concerns	0.800	265	0.425
Negative feelings	-0.761	264	0.447

†Item-level

Part 2: Gender differences between racial/ethnic groups:

Analysis 1:

In order to address the second part of research question 2-B¹², two analyses were conducted. First, the data file was split by racial/ethnic group, and then Independence Samples t-tests were conducted for each group to analyze gender differences between race/ethnic groups. All results were compared with those from the non-parametric equivalent, Mann-Whitney U test, because of the use of Likert-type and non-normally distributed data. For this analysis, there were

¹² RQ 2-B: Are there differences based on gender both within and between racial/ethnic groups?

no statistically significant differences found for African Americans and all other non-white racial groups. This may be due to the low sample size for each of those racial categories ($n = 41$ and $n = 31$ respectively). However, statistically significant differences between genders were found for Whites.

White women had higher mean scores than white men for all importance scales except negative feelings (Table 22). Differences were statistically significant as follows (Table 23):

- Environmental/ecological function scale: The difference in scores for white females (4.83 ± 0.302) and white males (4.70 ± 0.446) was significant with $t(190) = 2.363$, at $p = .019$.
- Cultural scale: The difference in scores for white females ($4.50 \pm .554$) and white males ($4.46 \pm .635$) was significant with $t(188) = 2.418$, at $p = .017$.
- Education scale: The difference in scores for white females ($4.78 \pm .408$) and white males ($4.48 \pm .598$) was significant with $t(189) = 4.121$, at $p = .000$.
- Health and well-being scale: The difference in scores for white females ($4.85 \pm .401$) and white males ($4.67 \pm .589$) was significant with $t(189) = 2.458$, at $p = .015$.
- Aesthetics scale: The difference in scores for white females ($4.92 \pm .338$) and white males ($4.79 \pm .473$) was significant with $t(189) = 2.209$, at $p = .028$.
- Sense of place scale: The difference in scores for white females ($4.30 \pm .737$) and white males ($4.05 \pm .834$) was significant with $t(189) = 2.120$, at $p = .035$.
- Spiritual scale: The difference in scores for white females (3.66 ± 1.012) and white males (3.18 ± 1.042) was significant with $t(184) = 3.126$, at $p = .002$.
- Interactions scale: The difference in scores for white females ($4.23 \pm .950$) and white males ($4.04 \pm .635$) was significant with $t(190) = 2.072$, at $p = .04$.

Table 22: Descriptive statistics for importance scales, white males and females

Importance Scale/item		N	Mean	Std. Dev.
Environment/Ecological Function	White females	119	4.83	0.302
	White males	73	4.70	0.446
Economic	White females	118	4.57	0.510
	White males	73	4.46	0.635
Culture	White females	118	4.50	0.554
	White males	72	4.28	0.709
Education	White females	119	4.78	0.408
	White males	72	4.48	0.598
Health and well-being	White females	118	4.85	0.401
	White males	73	4.67	0.589
Aesthetics	White females	118	4.92	0.338
	White males	73	4.79	0.473
Products	White females	116	4.39	0.785
	White males	73	4.35	0.782
Sense of Place	White females	118	4.30	0.737
	White males	73	4.05	0.834
Spiritual	White females	115	3.66	1.012
	White males	71	3.18	1.042
Recreation†	White females	118	4.84	0.413
	White males	72	4.60	0.744
Interactions	White females	119	4.23	0.590
	White males	73	4.04	0.635
Concerns	White females	119	4.42	0.646
	White males	72	4.26	0.806
Negative feelings	White females	118	2.88	0.576
	White males	72	3.02	0.557

†Item-level

Table 23: Differences in perceptions of trees and forests by white males and females, Independence Samples t-test

Importance scale	t	df	p
Environment/Ecological function	2.363	190	0.019
Economic	1.399	189	0.163
Culture	2.148	188	0.017
Education	4.121	189	0.000
Heath & well-being	2.458	189	0.015
Aesthetics	2.209	189	0.028
Products	0.303	187	0.762
Sense of place	2.120	189	0.035
Spiritual	3.126	184	0.002
Recreation†	2.879	188	0.004
Interactions	2.072	190	0.040
Concerns	1.516	189	0.131
Negative feelings	-1.570	188	0.118

†Item-level

Analysis 2:

A combined gender and race/ethnicity variable was created for the second analysis to address the second part of research question 2-B¹³. This variable categorized participants as a) black females, b) black males, c) white females, d) white males, e) all other females, and f) all other males. One-way Analysis of Variance (ANOVA) was conducted to assess differences by the combined gender and race/ethnicity category. All ANOVA results were confirmed with the non-parametric equivalent test, Kruskal Wallis, because of the use of Likert-type and non-normally distributed data.

¹³ RQ 2-B: Are there differences based on gender both within and between racial/ethnic groups?

A statistically significant difference between combined gender and racial/ethnic groups was found for the environmental/ecological function importance scale determined by the one-way ANOVA ($F(5, 257) = 2.906, p = .014$) (Table 24). Post-hoc analyses (Tukey-Kramer test) showed weakly ($p < .10$) statistically significant differences between black females and white females, and between black males and white females. Black females (4.60) and black males (4.54) had slightly lower mean scores for the environmental/ecological function importance scale than white females (4.79).

Another statistically significant difference between combined gender and racial/ethnic groups was found for the economic importance scale determined by the one-way ANOVA ($F(5, 254) = 2.547, p = .029$) (Table 24). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences ($p < .05$) between black females and white females. This difference was weakly ($p < .10$) confirmed with the non-parametric equivalent Kruskal Wallis test. Black females had slightly lower mean scores (4.16) for the economic importance scale than white females (4.57).

Differences between combined gender and racial/ethnic groups were found statistically significant for the educational importance scale determined by the one-way ANOVA ($F(5, 255) = 4.749, p = .000$) (Table 24). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences ($p < .01$) between white females and white males. White females had slightly higher mean scores (4.78) for the educational importance scale than white males (4.48).

A statistically significant difference between combined gender and racial/ethnic groups was found for the sense of place importance scale determined by the one-way ANOVA ($F(2, 254) = 4.287, p = .001$) (Table 24). Post-hoc analyses (Tukey-Kramer test) showed statistically significant ($p < .05$) differences between black males and both white females and all other

females. Black males had slightly lower mean scores (3.51) for the sense of place importance scale than both white females (4.30) and all other females (4.45).

Differences between combined gender and racial/ethnic groups were found statistically significant for the spiritual importance scale determined by the One-way ANOVA ($F(5, 255) = 2.748, p = .019$) (Table 24). Post-hoc analyses (Tukey-Kramer test) were unclear. Similarly, differences were found for the concerns scale determined by the One-way ANOVA ($F(5, 259) = 3.121, p = .009$) (Table 24). Post-hoc analyses were unclear.

Table 24: Differences in perceptions on the importance of trees and forests by race/ethnicity and gender combined (One-way ANOVA)

Importance scale	df	SS	MS	F	<i>p</i>
Environment/Ecological function	5	2.26	0.452	2.906	0.014
Economic	5	4.303	0.861	2.547	0.029
Culture	5	2.935	0.587	1.506	0.188
Education	5	6.208	1.242	4.749	0.000
Heath & well-being	5	2.19	0.438	1.937	0.089
Aesthetics	5	1.104	0.221	1.539	0.178
Products	5	2.508	0.502	0.872	0.501
Sense of place	5	13.431	2.686	4.287	0.001
Spiritual	5	15.589	3.118	2.748	0.019
Recreation†	5	2.832	0.566	1.715	0.132
Interactions	5	3.379	0.676	1.641	0.149
Concerns	5	9.584	1.917	3.121	0.009
Negative feelings	5	1.401	0.28	0.754	0.584

†Item-level

Discussion of gender differences:

In concordance with literature that women tend to exhibit greater environmental concern (Bell & Braun, 2010; Dietz et al., 2002; Hunter et al., 2004; McCright & Xiao, 2014), women

had higher mean scores (indicating a higher level of agreement) for all but two importance scales. This was significant for environmental/ecological function, cultural importance, educational importance, health and well-being, aesthetics, sense of place, and spirituality. Women and men agreed equally on the importance of trees and forests for providing timber and non-timber products. Men showed slightly higher agreement with the negative feelings scale, which poses an interesting question about the gendered nature of people's perceptions of trees and forests. In this study, women had higher levels of agreement with many facets of trees and forests, and were in disagreement with the inherent negative aspects of trees and forests.

Gender differences between racial/ethnic group were difficult to establish with certainty. This may be due to the low representation of non-white participants. The first analysis found significant differences between white females and white males; however, no significant gender differences were found for African Americans and other non-white minorities. The second analysis examined differences between participants based on their gender and race combined into one variable. A significant finding from this analysis is that white females, overall, expressed higher levels of agreement with most importance scales than white males, black females and males, and all other females and males. These results demonstrate the impact of having a diverse sample in order to capture the range of perceptions on the importance of trees and forests, and the necessity to analyze racial and gender differences if interested in fully understanding these perceptions. With women of color leading environmental justice activism in their communities (Kaalund, 2004; Verchick, 2004), it is necessary to investigate the gendered racial differences further for clarity and understanding.

Differences by Sample Group:

RQ 2-C Are there differences based on the different sampling and data collection methods?

For all scales except that measuring negative feelings, sample group 3 (purposive/in-person) mean scores were higher than those from sample groups 1 (random) and 2 (disproportionate), indicating a higher level of agreement (Table 25). One-way Analysis of Variance (ANOVA) was conducted to test for differences in perceptions on the importance of trees and forests by sample group. All ANOVA results were confirmed with the non-parametric equivalent test, Kruskal Wallis, because of the use of Likert-type and non-normally distributed data.

There was a statistically significant difference in perceptions on the cultural importance of trees and forests for sample groups as determined by the one-way ANOVA ($F(2, 278) = 3.973, p = .02$) (Table 26). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences between sample group 1 and sample group 3. Sample group 1 had slightly lower mean scores (4.35) for the cultural importance scale than both sample group 2 (4.44) and sample group 3 (4.63) (Table 25).

A statistically significant difference in perceptions on the educational importance of trees and forests for sample groups was also found as determined by the one-way ANOVA ($F(2, 280) = 3.094, p = .047$) (Table 26). Post-hoc analyses (Tukey-Kramer test) showed weakly statistically significant differences ($p < .10$) between sample group 1 and sample group 3. Sample group 1 had slightly lower mean scores (4.62) for the educational importance scale than both sample group 2 (4.63) and Sample Group 3 (4.81) (Table 25). However, this result was weakly confirmed ($p < .10$) with the non-parametric equivalent, Kruskal Wallis test.

Differences in perceptions on the sense of place importance of trees and forests for sample groups was also found statistically significant as determined by the one-way ANOVA ($F(2, 276) = 3.61, p = .028$) (Table 26). Post-hoc analyses (Tukey-Kramer test) showed statistically significant differences ($p < .05$) between sample group 1 and sample group 3. Sample group 1 had slightly lower mean scores (4.07) for the sense of place importance scale than both sample group 2 (4.11) and sample group 3 (4.41) (Table 25).

Table 25: Descriptive statistics for importance scales by sample group

Importance Scale/Item		N	Mean	Std. Dev.
Environment/Ecological Function	Group 1	123	4.72	0.417
	Group 2	102	4.69	0.435
	Group 3	60	4.84	0.286
Economic	Group 1	121	4.47	0.595
	Group 2	101	4.49	0.606
	Group 3	59	4.52	0.566
Culture	Group 1	123	4.35	0.658
	Group 2	98	4.44	0.636
	Group 3	60	4.63	0.538
Education	Group 1	123	4.62	0.563
	Group 2	100	4.63	0.550
	Group 3	60	4.81	0.364
Health and well-being	Group 1	122	4.73	0.508
	Group 2	101	4.70	0.529
	Group 3	60	4.86	0.418
Aesthetics	Group 1	122	4.83	0.438
	Group 2	101	4.84	0.393
	Group 3	60	4.93	0.236
Products	Group 1	119	4.43	0.707
	Group 2	101	4.37	0.834
	Group 3	60	4.50	0.722
Sense of Place	Group 1	121	4.07	0.850
	Group 2	99	4.11	0.874
	Group 3	59	4.41	0.682
Spiritual	Group 1	118	3.50	1.045
	Group 2	98	3.56	1.178
	Group 3	58	3.76	1.082
Recreation†	Group 1	121	4.68	0.622
	Group 2	98	4.72	0.622
	Group 3	58	4.86	0.476
Interactions	Group 1	122	4.13	0.621
	Group 2	101	4.05	0.731
	Group 3	59	4.28	0.557
Concerns	Group 1	122	4.20	0.794
	Group 2	100	4.35	0.812
	Group 3	57	4.45	0.790
Negative feelings	Group 1	121	2.98	0.681
	Group 2	101	2.91	0.636
	Group 3	57	2.89	0.550

†Item-level

Table 26: Differences in the perceptions of the importance of trees and forests by sample group

Independent variable	df	SS	MS	F	p
Environment/Ecological					
Function	2	0.844	0.422	2.631	0.074
Economic	2	0.084	0.042	0.119	0.887
Culture	2	3.122	1.561	3.973	0.02
Education	2	1.69	0.845	3.094	0.047*
Health & well-being	2	0.992	0.496	1.996	0.138
Aesthetics	2	0.469	0.235	1.566	0.211
Products	2	0.603	0.302	0.524	0.593
Sense of place	2	4.931	2.465	3.61	0.028
Spiritual	2	2.643	1.322	1.089	0.338
Recreation†	2	1.344	0.672	1.9	0.152
Interactions	2	1.994	0.997	2.355	0.097
Concerns	2	2.575	1.288	2.014	0.135
Negative feelings	2	0.415	0.208	0.508	0.603

†Item-level *This finding was confirmed weakly ($p < .10$) with the Kruskal Wallis test

Discussion of sample group differences:

A purpose of this study was to obtain a representative sample through mixing sampling and data collection methods. One aspect of this methodological exploration was to examine for differences between the sample groups. Sample group 3 had a higher level of agreement with all scales except that measuring negative feelings (statistically significant for three scales). This does lead to questioning if the in-person survey mode combined with purposive sampling had some effect on participant response, which is often discussed in survey research literature (Dillman et al., 2009a). For example, participants in sample group 3 had a personal interaction with the researcher before and after completing the survey. This may have affected response. Also, the presence of a researcher may have influenced a participant to respond more favorably

than if they had received the survey anonymously in the mail. There is also the issue of bias. Perhaps several participants with a more favorable attitude towards trees and forests chose to participate because of the salience of the topic. A deeper exploration of the sample group differences may be explored in the future to provide a better understanding of these potential nuances.

Path Analysis:

A path analytic approach was used to understand more complex relationships between race, gender, and education level. Path analysis uses regression models to analyze “chains” of influence, or direct and indirect effects when there are several predicting independent variables. It is a method that is powerful for assessing the strengths of complex relationships in hypothesized models (Agresti & Finlay, 1997; Propst & Koesler, 1998; Streiner, 2005), such as if variable X influences variable Y, which in turn influences variable Z. Path analysis cannot prove causality, but it can help make more sense of complex relationships (Streiner, 2005). Endogenous and exogenous variables were chosen for this analysis based on correlated relationships (Table 27) and to examine if education level (exogenous) was influencing, or mediating relationships between variables.

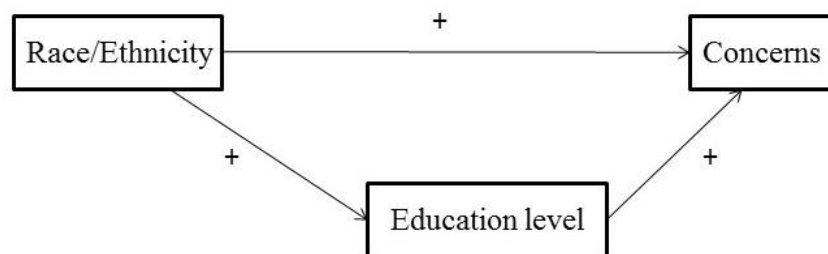
Table 27: Pearson correlations for variables used in path analytic approach

	RA	EL	GE	EF	CO
RA Race	1.0				
EL Education level	0.108	1.0			
GE Gender	0.039	-0.043	1.0		
EF Eco. Function	0.208**	0.198**	-0.142*	1.0	
CO Concerns	.195**	.153*	-0.049	0.536**	1.0

* $p < .05$, ** $p < .01$

Earlier ANOVA analyses showed that there was a statistically significant relationship between race/ethnicity and concerns for trees and forests. Participant education level and race/ethnicity were both correlated with concerns, though education level and race were not correlated with each other (Table 27). Attempting to examine strengths of the relationships and potential spurious correlations, the first path model explored if participant education level (EL) mediated the relationship between race/ethnicity (RA), and concerns (CO) people had for trees and forests (Figure 4). Gender was excluded from the initial proposed model because gender was not significantly correlated with any of the other endogenous or exogenous variables.

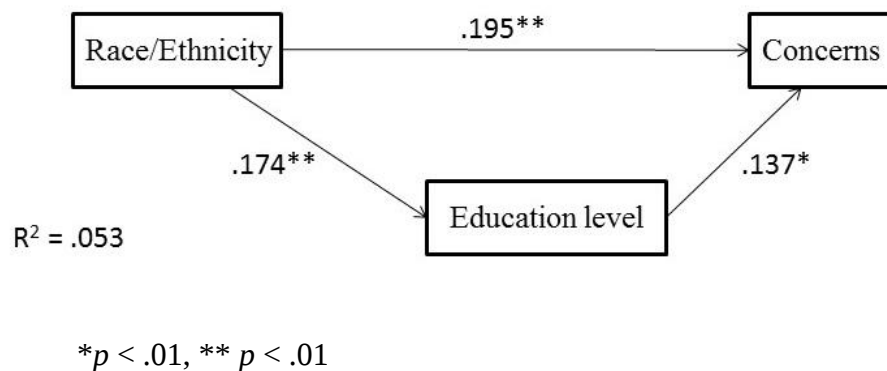
Figure 4: Proposed path model for race, education level and concerns people had for trees and forests



$$CO = x_1RA + x_2EL + e_1$$

Path coefficients showed that race/ethnicity had both a direct and an indirect effect on concerns. The indirect effect was mediated by the influence of education level in a positive direction, indicating that as education increases, concerns also increase. Education level mediated the effects of race for measuring concerns people had for trees and forests (Figure 5). Statistically significant at p values less than .05 and .01, this effect accounts for 5.3% ($R^2 = .053$) of the variance in the model. The correlation between race and concerns may be somewhat spurious as education level appears to mediate the effects of race on concerns.

Figure 5: Full path model for race, education level and concerns people had for trees and forests



To further investigate if there were any possible gender differences despite the lack of significant correlation with other variables, the data file was split into two groups (males and females) and the model (Figure 4) was tested a second time. Splitting the data into male and female groups resulted in statistically significant findings related to gender differences. Path coefficients showed that for women, but not men, race/ethnicity had both a direct and an indirect effect on concerns (Table 28). The indirect effect was mediated by the influence of education level in a positive direction, indicating that, for women, as education increases, concerns also increase. Education level mediated the effects of race on concerns people had for trees and

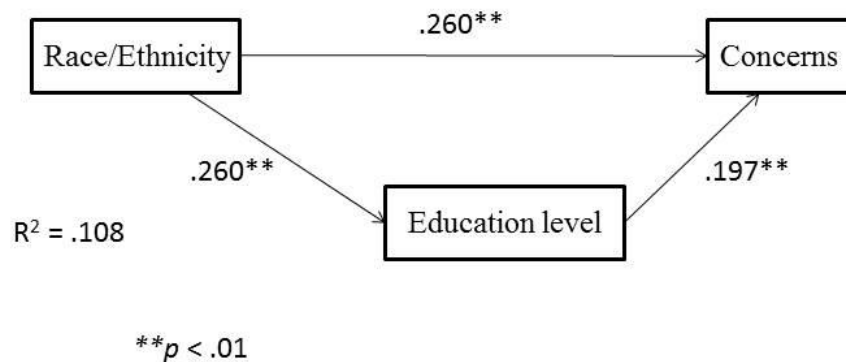
forests (Figure 6). This was statistically significant at p values less than .01 and the effect accounts for 10.8% ($R^2 = .108$) of the variance in the model.

Table 28: Path coefficients of a model for race, educational level, and concerns for trees and forests

Endogenous (Dependent) Variable	RA	EL	R^2	F	Significance
Concerns (CO)					
Full sample	0.174	.137*	0.053	7.343	**
Males	0.065	0.032	0.005	0.262	ns
Females	0.26	0.197	0.108	9.339	**

* $p < .05$ ** $p < .01$

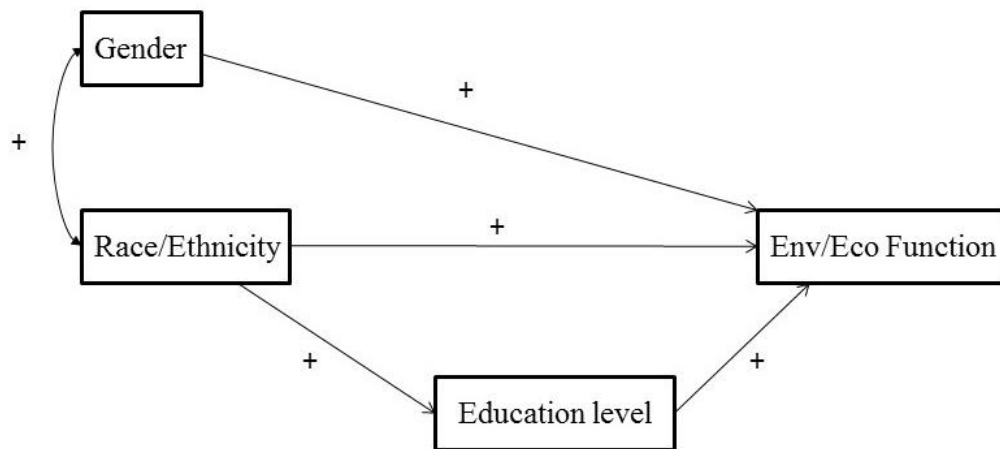
Figure 6: Full path model for race, education level and concerns for trees and forests, females only



Earlier ANOVA tests showed that there was a statistically significant relationship between race/ethnicity and the perceived importance of environmental and ecological function of trees and forests. An Independent Samples t-test also showed statistically significant gender differences in the perceived importance of environmental and ecological function of trees and

forests. Education level, race/ethnicity, and gender were correlated with environment/ecological function, though education level, race, and gender were not significantly correlated with each other (Table 27). Attempting to examine strengths of the relationships and potential spurious correlations, the second path model assessed if education level (EL) mediated the relationship between race/ethnicity (RA) and environment/ecological function (EF) of trees and forests (Figure 7). The proposed model includes the relationship between gender (GE) and perceptions of the importance of environmental and ecological function, and shows the weak but positively correlated relationship between gender and race/ethnicity.

Figure 7: Proposed path model for education level, race and the environmental and ecological function of trees and forests



$$EF = x_1RA + x_2EL + e_1$$

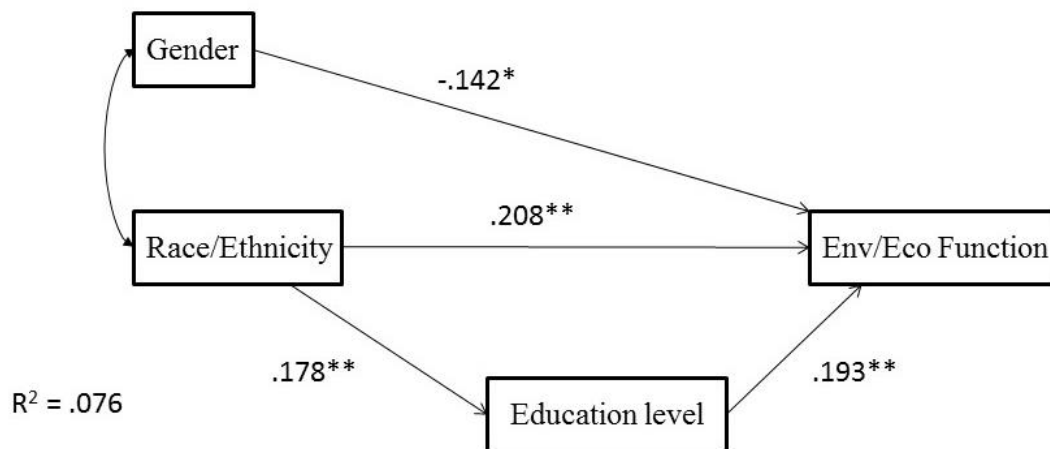
$$EF = x_1GE + e_2$$

$$EL = x_1RA + e_3$$

$$EF = x_1RA + e_4$$

Path coefficients showed that race/ethnicity had both a direct and an indirect effect on environment/ecological function. The indirect effect was mediated by the influence of education level in a positive direction, indicating that as education increases, perceived importance of the environmental and ecological function of trees and forests also increase. The finding was statistically significant at p values less than .05 and .01 (Figure 8). This effect accounts for 7.6% ($R^2 = .076$) of the variance in the model. The correlation between race and environment/ecological function may be somewhat spurious as education level appears to mediate the effects of race on concerns. The path coefficients also showed that gender had a direct effect on perceived importance of the environmental and ecological function of trees and forests. This effect appears to be unmediated by other variables. There were no additional statistically significant findings based on gender when analyzing the data file split into groups of males and females.

Figure 8: Full path model path model for education level, race and the environmental and ecological function of trees and forests



* $p < .01$, ** $p < .01$

Discussion of path analysis:

A path analytic approach was implemented to further understand the complex relationships between variables and if there was any effect on perceptions. Specific variables were chosen based on relationships with race and gender, which are the focus of this study. Earlier analyses in this chapter may lead one to wonder why the income level or employment status variables were not included in the path models. Income level and employment status variables were not correlated with environmental and ecological function or concerns (the endogenous variables in the path models). However, income level and employment were correlated with education level, and educational level may have an effect on income level and employment status. All these things considered, educational level was chosen as a potential mediating variable for the path model.

In these analyses, participant education level mediated the relationship between race and concerns for trees and forests, and also race and perceptions of the environmental/ecological importance of trees and forests. When analyzed further, the finding that education level mediated the relationship between race and concerns for trees and forests was found to be stronger for women as the model explained 10.8% of the variance, compared to 5.3% for the full sample. These findings provide an additional and interesting nuance to understanding the importance of trees and forests from diverse perspectives in that one's education level plays a role in people's environmental perceptions, and for women, it seems to play a stronger role for environmental concern. For men, another variable may mediate this relationship. These findings resonate with other research studies that suggest education level is associated with higher levels of environmentalism (Arcury & Christianson, 1990; Arcury, Johnson, & Scollay, 1986; McMillan, Hoban, Clifford, & Brant, 1997; Milbrath, 1984; Van Liere & Dunlap, 1980) and studies

showing that women exhibit greater environmental concern (Bell & Braun, 2010; Dietz, Kalof, & Stern, 2002; Hunter, Hatch, & Johnson, 2004; McCright & Xiao, 2014).

There are many possible ways to conduct a path analysis with these data. A simple exploration was conducted to see if there were some connections related to the literature. Other relationships between variables need to be further explored. Research suggests that environmental value orientations (spiritual, utilitarian, etc.) do influence perceptions related to forest management (Dutcher et al., 2007; Li et al., 2010). Future path models may investigate if one's sense of place, or one's spiritual connection to trees and forests mediates the effects of race, gender, age, etc., on perceived importance of trees and forests.

Participant evaluation of survey methodology:

RQ 3: What study design factors influenced the research participants to participate?

A total of eleven people participated in the evaluative portion of this study, via personal interviews and focus group. Six participants received the survey via mail and five received the survey in person. Of the 11 participants, seven were female, four were male, two were Black/African American, and nine were White/Caucasian (Table 29).

Table 29: Characteristics of evaluative sample

n = 11	Black/African American	White/Caucasian
Female	2	5
Male	0	4

Data were analyzed qualitatively. First, notes and transcripts were read through carefully to explore emerging ideas. The ideas were then documented and separated into categorical themes. Then, the notes and transcripts were read through a second time and assigned themes as appropriate. Themes included participant motivation, opinions towards surveys in general, the most and least interesting aspects of the survey, and tips offered by the participants to improve survey research (Table 30).

Table 30: Focus group/interview themes

Received survey by mail	6 participants (n = 11)
Motivation to participate	Interest in topic Opportunity to express opinion Influence decision-making
Opinions towards surveys in general	Mostly positive
Most interesting aspect	Spiritual value questions Health & well-being questions Environment/ecological function questions
Least interesting aspect	Questions about negative feelings associated with trees and forests
Tips	Shorten survey Survey in-person at baseball stadiums, shopping malls Survey in-person with option to take home with postage paid envelope

Motivation to participate:

Participants were asked about their motivation to participate in the survey on the importance of trees and forests. Consistently, participants answered that they had an interest in the topic, or that they wanted to take the opportunity to express their opinion. One participant

even offered that they were interested in the opportunity to influence decision-making. The following quotes are directly from the interviews and focus group:

“I like the subject matter.”

“I thought it was important to have an opinion about it and to express that opinion. If I could express it to the DNR I would. But I don’t have the opportunity.”

“Because I love trees and so if it’s going to help in decision making hopefully in a way that I would want it to. I don’t know, see, I never know what they are going to do with the information that they get.”

Opinions towards surveys in general:

When asked about their opinions towards surveys in general, participants expressed an overall positive view. Similar to their motivation to participate, they explained that they would participate in a survey if they felt the topic was important, relevant to them, or contributing to something positive. The exception to this was any survey that was also asking for a financial contribution or excessive personal information. The quotes that follow provide direct examples:

“I have always been a very, very willing survey person. Actually, more so if it came in the mail, because you have longer to work on it.”

“Well, it has to be interesting to me... That would be the biggest thing. A lot of them are nonsense surveys I just throw away more for business or for their capitalization. They thought maybe I would contribute to their business, that’s something I don’t care for. But this is more personal for me.”

“As long as a postage paid envelope is enclosed especially with the cost of postage going up.”

“The ones that ask to send a donation along with it I usually don’t complete.”

Most interesting aspects:

Participants were asked if there were any aspects of the survey that were especially interesting. Their favorite aspects of the survey included those addressing the spiritual value of trees and forests, questions related to health and well-being, and questions about the environmental and ecological function of trees and forests. In their view, the spiritual value and the contribution to a sense of health and well-being are often undervalued aspects of trees and forests. Additionally, the environmental and ecological function of trees and forests was viewed as a priority. The following quotes are examples directly from the participants:

“I have to say my favorite part of the survey was Question 9 because it’s a little more spiritual. I really like it.”

“Well I thought this was important, what they provide like, filter oxygen, provided oxygen so shelter and that kind of thing, I thought that was important.”

“I consider myself a spiritual person but I was more drawn to the question about balance of life and relaxing than I was to the spiritual aspect of it, making me closer to the Creator, I don’t think necessarily the two questions are related but I like the relaxing balance aspect better than the spiritual aspect, coming from a spiritual person.”

“I would agree that it affects both health-wise, being able to relax and have that down time, it’s good for your physical and mental health. But I focus on the spiritual only because that is where I feel God, where I sense the presence of a creator, not in a church. I just can’t see anybody looking at the things of nature and not being amazed. It’s just not only not being amazed how they can possibly think it came from nowhere just kind of magically appeared like that, it is so complex down to the tiniest smallest thing, the exquisite colors of an insect, the color of a butterfly, the many, many different colors of a butterfly, and the coloration of their wings. How it can smell so divine!”

Least interesting aspects:

The participants were also asked about their least favorite aspects of the survey. The main response from this question addressed the discomfort they felt about the questions on negative

feelings associated with trees and forests. Participants felt this question was odd because it seemed out of place, and in contrast to the rest of the survey. They also felt the question was confusing because the value of trees and forests cannot be overshadowed by the perceived negative associations. The following quotes provide examples:

“The very last question was my least favorite. It seemed out of place.”

“I just thought who could say anything negative about trees?”

“I felt awkward answering the last question because even though there are some pesty things that come along with trees, they are worth so much more than those pesty things! I had a hard time answering that question.”

Tips to improve survey research:

Lastly, participants were asked if they had any advice, tips, or comments about how to improve survey research in general, how to increase representation, and specifically for studying the importance of trees and forests. A few participants suggested shortening the survey instrument, especially if surveying in person. For surveys in general, participants recommended surveying at baseball stadiums (Comerica Park in Detroit) that attract diverse people from all across the state of Michigan, or even shopping malls. They also encouraged surveying in person, at shopping malls or farmers markets, with the option to take the survey home with a postage paid envelope for return. The following quotations serve as direct examples from the data:

“My first thought was to go to a Tiger baseball game because people are from Grand Rapids and Flint and all around the state.”

“Certainly the people at the farmers markets, they should have interest and the people who came there certainly should have an interest.”

“I am assuming malls would, you would sure get diversity but I don’t know if you would get anybody interested. Could you just have them take the survey home, not necessarily have them fill it out there, that kind of thing? Maybe that would work, that’s the best I

can tell you. If you had it all set up with a return address stamped and all that and they were interested enough to ask you or you promoted it that way.

Discussion of evaluative findings:

The evaluative data collection revealed that participants chose to complete the survey because they had an interest in the topic, or were taking the opportunity to express their opinion. None of the focus group participants discussed the VISA gift card lottery incentive as a reason for completing the survey. Focus group and interview participants had mostly positive feelings towards surveys in general, and provided practical tips to improve the survey research process. Some of the tips at first do not seem useful or feasible for the goals of this study or future studies on the importance of forests. It may be worthwhile to explore the practicality of conducting surveys in a shopping mall or baseball stadium to contribute to the development of a representative sample.

Focus group and interview participants also elaborated on the survey questions that were most interesting and those that were least interesting, which is helpful for further survey development. From the results of the focus group and interviews, it seems clear that only those interested in the topic of trees and forests continued their participation through the evaluative feedback, presenting an additional bias. Lastly, the sample for this phase of the research was not racially representative. Rather it was over-representative of white Lansing residents and females.

Summary of results and discussion:

This study had two purposes. It examined the usefulness of mixing survey sampling and data collection modes to achieve a racially/ethnically- and gender- representative sample for

understanding the importance of trees and forests. The results indicate that mixing sampling methods and data collection modes does increase the racial representativeness of survey participants, thus providing a contribution to the goals of sustainable forests management (collecting data on the diversity of ways the trees and forests are important from the diversity of people).

Findings show that there are important differences based on race/ethnicity and gender in how people perceive trees and forests to be important, addressing the second purpose of this study. Data also show that there may be mediating factors accompanying race (and perhaps gender) influencing perceptions on the way trees and forests are valued. The findings presented provide strong support to collect data from diverse audiences if committed to sustainable forests management.

Survey findings concurred with qualitative data from an earlier study informing this research showing that the developed metrics were acceptable for measuring the importance of trees and forests. Some aspects of the survey need revisions for participant clarity. Responses from evaluative focus groups and interviews provided valuable feedback on this particular study and the survey research process in general.

CHAPTER 5:

CONCLUSION

The United States has committed itself to sustainable forests management (SFM) which considers the needs of present and future generations across the ecological, economic, and social dimensions of forest use. SFM calls attention to the social aspects of forest management by requiring the participation of an informed, aware, and engaged public. This presents a need for research on the social dimensions of forestry, including understanding perceptions of the importance of trees and forests, to support the goals of SFM. However, the literature suggests those participating in forestry research are mostly middle- to senior-aged, educated, white males inaccurately representing the diversity of the United States populace.

Many natural resource professionals attribute the absence of diverse participants in forestry research to a lack of interest from those that do not participate. However, data suggest that people do not participate because of the lack of opportunity and access, resulting in justice and equity issues. Understanding perceptions from the diversity of people is vital because perceptions may influence support (or lack of) for forest management. The significance of this issue only grows as the U.S. continues to diversify.

Responding to the justice and equity issue of low representation of racial/ethnic minorities and women in SFM research, this study explored the mixing of survey sampling and data collection techniques with the intention to achieve a representative sample. The exploration resulted in a racially representative sample and collected diverse data on the importance of trees and forests uncovering nuanced differences based on race, gender, and sample group. This

chapter provides a brief summary of the findings, directions for future research, study limitations, implications, and a conclusion.

Summary of the findings:

Mixing methods and sample representativeness

One study objective was to examine the usefulness of mixing survey sampling and data collection methods to achieve a racially/ethnically- and gender- representative sample for understanding the importance of trees and forests. More specifically, three different pairings of sampling and data collection methods were tested: Sample group 1 was randomly chosen and received a survey questionnaire in the postal mail. Sample group 2 was chosen disproportionately random and also received a survey questionnaire in the postal mail. Lastly, sample group 3 consisted of participants chosen purposively and received a survey questionnaire in person with an introduction to the study including relevant background information. The survey data collection was followed by interviews and a focus group with willing survey participants to discuss the survey research process.

Combining methods provided a useful methodology for achieving a racially representative and gender-diverse survey sample. A total of 285 Lansing residents participated in the survey data collection. Women are often underrepresented in forestry and natural resource-related research, yet for this study women were overrepresented in each sample group: Sample group 1 consisted of 59% females, sample group 2 had 68% females, and sample group 3 achieved 60% female representation. Individual sample groups varied in their racial representativeness with sample group 1 containing the least diversity (72% White, 13% Black,

15% Other) and the most diversity found in sample groups 2 (64% White, 21% Black, 17% Other) and 3 (60% White, 20% Black, 17% Other).

The complete sample was 61% female, 39% male, 70% White, 18% Black, and 12% Other, with a variety of ages, income, education, and employment levels. Combining a sample with random, disproportionate, and purposive elements resulted in a more diverse sample of participants. None of the utilized sampling methods were entirely useful for achieving representativeness on their own: Sample group 1 was randomly chosen, but lacked diversity/representativeness. Sample group 2 was disproportionately chosen with more diverse racial representation, but was restricted to specific geographic areas, limiting coverage. Sample group 3 was purposively chosen and more diverse, but lacked the element of randomness. This idea of representation is reflected in literature calling for the use of mixed methods to appropriately answer research questions (Tashakkori & Teddlie, 1998) and the mixing of survey modes may help to reduce survey errors (Dillman et al., 2009).

Metrics

Previous qualitative research on the importance of trees and forests provided rich data used to create the survey metrics for this study. Twelve scale factors and one item level question addressed many ways in which trees and forests may be important to people in a Likert style format. Metrics developed to understand the perceived importance of trees and forests were successful overall. Ten of the twelve scale factors demonstrated good or excellent reliability measured using Cronback's alpha including those measuring environmental/ecological function, cultural, educational, aesthetic, and spiritual importance, health and well-being, forest products, sense of place, interactions, and concerns related to trees and forests. Two scale factors, measuring economic importance and negative feelings associated with trees and forests, had

questionable alpha coefficients and require revisions for future use. One item from the economic importance scale was inconsistent with other items. Participants seemed confused about the question on negative feelings associated with trees and forests. More details on this surfaced in the evaluative focus group and interviews.

Percent agreement (the percentage of participants that chose “agree” or “strongly agree”) was 70% or higher for most scales, and all scales except one were positively correlated with one another. These findings indicate an overall positive attitude towards trees and forests. Findings on the perceived importance of trees and forests reflect those found in previous studies informing this research. The developed survey instrument provides a foundation for future data collections on the importance of trees and forests.

Racial differences

The second study objective was to analyze data on the importance of trees and forests. Survey data showed important differences based on race/ethnicity and gender in how people perceive the importance of trees and forests. Whites and “other” racial minorities tended to express higher levels of agreement with scale questions compared to African Americans. These findings were statistically significant for scales measuring environmental/ecological function, economic importance, sense of place, health and well-being, and concerns for trees and forests. African Americans survey scores were still quite favorable overall, but with more variation in response. Whites had the lowest mean scores for the spiritual importance scale compared to African Americans and all “others.”

An examination of item level questions from the negative feelings scale showed that African Americans had higher levels of agreement with statements measuring feeling unwelcome in forests or parks, and having a safety concern when near trees or forests. These

findings concur with previous qualitative data on the importance of trees and forests and the literature on the lingering historical effects of racism, civil rights, and slavery (Leatherberry, 2000; Meraji, 2015; Taylor, 2002). Findings give more strength to the argument that diversity in sampling is critical for truly understanding the importance of trees and forests to people. Otherwise, nuances such as these differences related to feelings of safety and unwelcome may go unnoticed and unaddressed.

Weighted data analysis

Weighting as a statistical tool was tested for its effectiveness to account for data that lacked racial representativeness, such as that found in sample group 1. Data from sample group 1 were weighted to reflect the racial characteristics of the study population and the ANOVA test assessing differences based on race was repeated. The weighted sample group 1 ANOVA data were compared to unweighted data from sample group 2. This analysis showed inconsistent results when comparing the weighted and unweighted data indicating that for this study, weighting data was only marginally successful in compensating for the lack of racial representativeness.

Gender differences

Women expressed higher levels of agreement with all importance scales which is supported by literature showing that women tend to exhibit greater environmental concern (Bell & Braun, 2010; Dietz et al., 2002; Hunter et al., 2004; McCright & Xiao, 2014). These findings were statistically significant for the scales measuring environmental/ecological function, cultural, educational, aesthetic, and spiritual importance, health and well-being, and sense of place. An ANOVA test examining gender and race showed that white women had the highest levels of

agreement with importance scales, overall, compared to white men, and nonwhite men and women, though these findings should be interpreted cautiously due to differing sizes of the analyzed groups (white men, white women, black men, black women, other men, other women). Women (and people) of color are at the forefront of the environmental justice movement engaging in community activism (Kaalund, 2004; Verchick, 2004) and as such, it is necessary to investigate the gendered racial differences further.

Sample group differences

Sample group differences on the perceived importance of trees and forests were found through an ANOVA test. Sample group 3, which consisted of participants taking the survey in-person, demonstrated higher levels of agreement with all scales except that measuring negative feelings associated with trees and forests. These differences were statistically significant for factors measuring cultural and educational importance and sense of place. Participants in sample group 3 had a personal interaction with the researcher along with an introduction to the research. It is unclear if this interaction affected response.

Mediating factors

A path analysis approach suggested that there may be mediating factors accompanying race that influence perceptions on the way trees and forests are valued, and that the mediating factors may differ for men and women. Specifically, one path model showed that participant education level mediated the relationship between race and perceived importance of the environmental/ecological function of trees and forests. Previous studies suggest that education level is associated with higher levels of environmentalism (Arcury & Christianson, 1990; Arcury et al., 1986; McMillian et al., 1997; Milbrath, 1984; Van Liere & Dunlap, 1980).

Another path model showed that for women, but not men, education level mediated the relationship between race and concerns for trees and forests. This relationship was significantly weaker for men. Again, these results agree with literature showing that women exhibit greater environmental concern (Bell & Braun, 2010; Dietz et al., 2002; Hunter et al., 2004; McCright & Xiao, 2014). The path analyses offer additional support for the importance of collecting data from diverse audiences instead of meeting the status quo, or collecting data from the same kinds of people over time. Again, without a diverse sample, certain details may go unnoticed and unaddressed.

Evaluative Findings

Responses from the evaluative focus group and interviews provided practical feedback on this study and survey research more generally. Participants reported an interest in the topic as the motivating factor for completing the survey and focus group/interview process. They answered questions about their opinions towards survey research in general, and questions about the most and least interesting aspects of the survey questionnaire. The most interesting aspects were described as questions addressing the spiritual importance of trees and forests, how trees and forests contribute to a sense of health and well-being, and questions about the environmental and ecological function of trees and forests. The least favorite aspect was the question addressing negative feelings towards trees and forests. Participants concluded the evaluative portion of this study by offering suggestions for recruiting a diverse sample of people.

The evaluative portion of this study helped to better understand motivations to participate, question comprehension, development, and revision, and approaches to sampling and data collection. Collectively, the findings from this study exemplify the importance of being flexible with research methodologies (if the goal is to have a diverse, representative sample), the

significant results a diverse sample can uncover (in this case, racial and gender differences), and the usefulness of engaging research participants in the evaluation process.

Suggestions for further research:

This study only begins to answer some questions and simultaneously raises new questions. The research provided an exploration of mixing sampling and data collection methods to achieve a representative sample for measuring people's perceptions of the importance of trees and forests. Results suggest that mixing methods contributes to recruiting a representative sample. The mixing of methods in this manner needs to be further developed. Since this study was exploratory in nature, it may be beneficial to repeat the study with a larger sample size and at a larger scale (regional, state or national level) to see if similar trends in sample representativeness emerge.

Recommendations for further research with in-person data collections (sample group 3) include working with more key informants to access a broader range of community events and organizations for recruitment. Small-scale studies could examine if there are particular seasons of the year that are more successful for this type of research. The in-person data collection for this study occurred in the summer months which had benefits (Michigan residents tend to spend more time outdoors at community events in the summer) and costs (Michigan residents travel in the summer months, so many people may not be present for research activities).

The primary concern for in-person data collections should be focused on making connections and building meaningful relationships with a variety of community organizations. This necessitates taking time to learn how the researcher can give back to the community group, or uncovering ways that the research will or can be directly beneficial to participants, which is a

goal of emancipatory research methodologies such as those used in many feminist, pragmatist, and environmental justice studies.

Future research can explore if different survey modes (in-person, mail, online) are more appealing to different age groups. In this study, younger persons were more likely to respond to in-person data collection. Is this simply due to chance, or is there a connection between data collection mode and age/generational preferences? Online surveys were not explored. With the increase of internet and web media in the lives of the younger generation, these modes require additional attention. The use of online surveys needs to be mixed with other modes because this method does not generally result in a racially, gendered, aged, or socioeconomically representative sample (Dillman et al., 2009a). Those responding to online surveys are mostly younger, white, and male (Kwak & Radler, 2002; Saxon, Garratt, Gilroy, & Cairns, 2003). Research shows many people still prefer mail surveys (Dillman et al., 2009a). Some focus group and interview participants expressed similar feelings about preferences for mail surveys. Mail survey research is here to stay at least for the immediate future, but it may be most representative if mixed modal, or by providing multiple options for survey participation (mail, in-person and/or online, for example).

Much can be learned from assessing relationships between socioeconomic variables to see if there are direct and indirect effects on perceptions of the importance of trees and forests. This study touched upon mediating variables through the interpretation of path coefficients. A deeper analysis is merited. For example, is there a relationship between one's perceived sense of place and perceptions on the importance of trees and forests? Women had higher levels of agreement with importance scales. Are there indirect effects of other variables influencing this level of agreement? Are there additional differences based on gender, if path models are

analyzed separately for males and females? Does race play a role in gendered differences on the perceived importance of trees and forests? A feminist intersectional research approach can help uncover the importance of relationships between variables.

Study Limitations:

Like all research methods, survey research has limitations. Limitations for this study include:

- The study used multiple sampling and data collection strategies. Combining sampling and data collection modes is often perceived as incompatible with inferential statistical analysis. This limitation is also assumed to be the strength for creating a more representative sample.
- The researcher chose to use a Delivery Sequence File (DSF) because the literature identifies this file as being reliable. The purchased list, though likely superior to other alternatives, still resulted in survey returns due to an unoccupied home or incorrect address.
- Lansing residents that only use a post office box did not receive a mailed survey.
- If the household receiving the survey did not speak English, they likely could not participate. The survey was given face-to-face in Spanish to two participants.
- The sampling focused on race/ethnicity and gender, though those are only two indicators of representativeness. Education, income, socioeconomic status (SES) and other indicators of representativeness were not critically assessed for sampling purposes in the interest of simplicity.

- The in-person data collection was biased towards low-income persons because of the lack of response from clubs/organizations with more income diversity.
 - Sample group 3 (in-person survey) was much smaller than sample groups 1 and 2.
 - Hundreds of people received this survey in the mail and chose not to complete and return.
- The data reported here only capture perceptions of a small proportion of the population. Examining the issue of nonresponse and sampling error needs to be critically considered when making any inferences from these data.

Implications:

Research methods

The most significant implication for this study is that mixing sampling and data collection methods did provide a more racially representative sample of survey participants. Traditional survey (probability/random) sampling provided the least demographic representation while disproportionate and purposive sampling provided a more realistic demographic representation. Weighting data to substitute for underrepresentation of some racial groups and overrepresentation of others proved problematic for this study as weighted results were inconsistent with results from the racially representative sample achieved with disproportionate sampling. This suggests that weighting data may be only marginally successful at accounting for a lack of racial representativeness.

Using different sampling and data collection methods presents a tradeoff. Traditional science requires strict adherence to rigid guidelines for research methods and any diversion from those guidelines is perceived to introduce bias. However, traditional survey sampling methods

generally do not produce representative samples, which is another type of bias. Traditional survey methodologies, especially used in forestry research, are successful for collecting data from mostly white, educated, older males. These samples tend to not be representative yet still the data are used as if they were. In many forestry and natural resource publications, the absence of nonwhites from research respondents is not even acknowledged.

Considering the rapidly changing U.S. racial and ethnic demographics (Collins, Hall, & Neuhaus, 1999; Ortman & Guarneri, 2009; Toosi, 2002; Waddington & Welkoff, 2010), inclusivity is imperative when working toward the Bruntland Report's (1987) definition of sustainability "...without compromising the ability of future generations to meet their own needs." The Bruntland Report's definition suggests it is a violation of sustainability to exclude diverse participants in the research process as they will comprise a larger proportion of future generations.

Research methods should be chosen based on the usefulness in relation to the research questions. To collect data from traditionally underrepresented groups (racial/ethnic minorities and women), it is necessary to use mixed methods for successful sampling. It is comparable to an employer asking an employee to complete a task and the employee is unable to complete the task because s/he did not know where to begin or the steps to take to accomplish the task. It seems obvious that if one method does not accomplish the task to switch to another method and keep trying. If the employee is not showing progress, eventually s/he will lose the job. It is not good enough to ignore or simply accept low representation. It is important to investigate why people do not participate, or if there are other more culturally-friendly methods that encourage people to participate if made available. In other words, it is important to understand the motivations and barriers to participation for different types of people.

The U.S. publishes a national report on the progress of SFM every five years. As the U.S. continues working towards SFM, the methodology developed for this study may be used to measure Indicator 6.44 “The Importance of Forests to People.” The survey instrument was successful at capturing perceptions of the perceived importance of trees and forests, and can be revised and improved over time. Mixing methods provided an example of how to achieve a representative sample. The methodology and survey instrument combined offer a useful tool to address the call for diversity described by Indicator 6.44 and to inform the five-year national reports.

Policy and management

The current study identified differences based on race/ethnicity and gender. These findings require additional exploration and attention by both researchers and professionals. People’s preferences and priorities vary. These differences may be important for prioritizing management objectives at different scales (neighborhoods to state and federal levels), regions, and for different types of forests. Racial and gender differences found in this study further emphasize the necessity to seek diversity in sampling to tease out differences and improve the understanding of people’s preferences and priorities so that resource managers can better meet the needs of society.

Decision-makers and/or resource managers will need to find ways to address differences in the ways that people perceive the importance of trees and forests. For example, in this study nonwhite racial minorities expressed stronger agreement with the spiritual importance of trees and forests. How can managers and natural resource professionals utilize this information for prioritizing management objectives? Similarly, how can decision-makers and natural resource professionals deal with gendered differences? What is the meaning behind these differences?

The differences identified here present new challenges that will require natural resource professionals to engage more with diverse groups of people. This requires a shift in the current culture of the natural resources field in general, as there is a lack of racial and gender diversity across all institutional levels, types of organizations, public participation activities, and research. While ongoing diversity training with a focus on inclusiveness may assist some professionals to address this challenge, more effective approaches need to be developed. Establishing and maintaining relationships with community organizations may help address the challenge as various organizations (neighborhood groups, non-profits, faith-based, etc.) are often the gatekeepers for diverse communities.

Diverse communities are less receptive to communicating with a stranger conducting research or soliciting participation in natural resource-related activities. Establishing relationships often requires meeting various community leaders face to face. Maintaining relationships entails continuing the communication through a variety of ways. Bringing interactive and educational activities and holding specific events relevant for a particular community may help foster relationships. These activities may help to build trust and understanding between resource professionals and the community of interest. The key is to focus on building a mutually beneficial relationship.

Conclusion:

It is critical for the quality of trees, forests, and other environmental resources that diverse voices are sought, heard, and integrated into the decision-making process. Understanding people's perceptions has the additional implication of understanding their level of acceptance and support for management decisions (Ford et al., 2014). Furthermore, participating in forestry-

related research and activities can promote proenvironmental attitudes (Liu et al., 2010) which is foundational for the success of sustainable forest management.

Over the last century forest management in the U.S. has begun to transition to more inclusivity. Despite some progress, there is still important work to be done for SFM to truly be considered “inclusive”. The research presented here is one step on the path towards creating a more inclusive and diversified research and decision/policy-making process in the field of forestry (and for the natural resources field more broadly). It presents a new approach to collecting data on the importance of trees and forests from a diverse audience and contributes to the scarce and growing literature examining racial and ethnic minorities, women, and the environment. Results exemplify the relevancy for participation of women and nonwhite minorities highlighting the need to consider issues of justice and equity in research methodologies.

APPENDICES

APPENDIX I:

Survey Instrument

Greetings from Michigan State University!

The United States has committed itself to managing forests for long term benefits for everyone, and one important aspect of that is listening to residents about the ways in which they value trees and forests. We are very interested in hearing from everyone, even if you do not think that your opinions about trees and forests are important. We can learn best about these issues by asking a variety of people to share their thoughts and opinions. You have been selected as part of a small sample so it is important to hear back from nearly everyone.

By taking a few minutes to share your thoughts and opinions, you will be helping us out a great deal. The information you share with us will be used to better understand the different ways that trees and forests are important to people and can be used to enhance forest management in areas near you and throughout the country. The return of this survey is your consent to participate in the research. Please return this survey using the postage-paid envelope in the next 10 days.

The questions should take about **15-20 minutes** to complete. Your responses are voluntary and will be kept confidential. Your answers will never be associated with your mailing address or your name. Please make sure that an adult (age 18 or older) in your household fills out the questionnaire.

If you have any questions about this study, such as scientific issues, how to do any part of it, or to report an issue please contact the **Principal Investigator** Maureen McDonough at 126 Natural Resources Building, Michigan State University, East Lansing, MI 48824, phone (517) 432-2293, email mcdono10@msu.edu. If you have questions about your role and rights as a research participant, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Director of MSU's Human Research Protection Programs, Kristen Burt, by phone: (517) 355-2180, fax: (517) 432-4503, email: irb@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

Upon receipt of your completed survey, you will be entered into a drawing to win one of four \$25 Visa Gift Cards to thank you for your time.

Sincerely,

Dr. Maureen McDonough
Professor and Researcher
Department of Forestry

Dori Pynnonen Hopkins, M.S.
Research and Doctoral Candidate
Department of Forestry

◆————◆ Importance of Trees and Forests

i. How long have you lived in your current residence?

_____ MONTHS or _____ YEARS

ii. What do you like most about your neighborhood?

iii. Did you grow up (ages 1-16) primarily in a(n): (check more than one, if applicable)

- ☐ Urban setting
- ☐ Suburban setting
- ☐ Rural setting

iv. What do you like most about being outside?

- ☐ Nothing. I do not like being outside.

v. Please check:

- ☐ I own my home.
- ☐ I rent my home.
- ☐ Other:_____

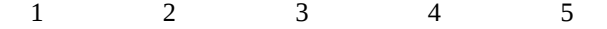
Many people find trees and forests to be important for a variety of reasons. The following several sections of this survey are asking you about the different ways trees and forests are important or not important to you.

The first question is asking how trees and forests are important to you in relation to the environment or ecological function. Please describe the extent to which you agree or disagree with the following statements.

[illegible]

[illegible][illegible][illegible]

The fifth question is asking about the ways in which trees and forests influence human health and a sense of well-being. Please describe the extent to which you agree or disagree with the following statements.

Question 5						6
	Strongly Disagree		Neutral		Strongly Agree	Don't Know
1. Trees and forests are relaxing	☐		☐		☐	☐
2. Trees and forests provide a place for privacy/solitude	☐		☐		☐	☐
3. Trees and forests provide a place for “escape” or to “get away”	☐		☐		☐	☐

Some people find trees and forests to be important for their beauty. For Question 6, please describe the extent to which you agree or disagree with the following statements regarding the aesthetic importance of trees and forests.

[illegible]

Trees provide a variety of products. In response to Question 7, please describe the extent to which you agree or disagree with the following statements, regarding the importance of the products that come from trees and forests.

[illegible]

[illegible][illegible]

The following question addresses some of the ways people have stated that they enjoy or interact with trees and forests. For Question 10, please describe the extent to which you agree or disagree with the following statements.

[illegible]

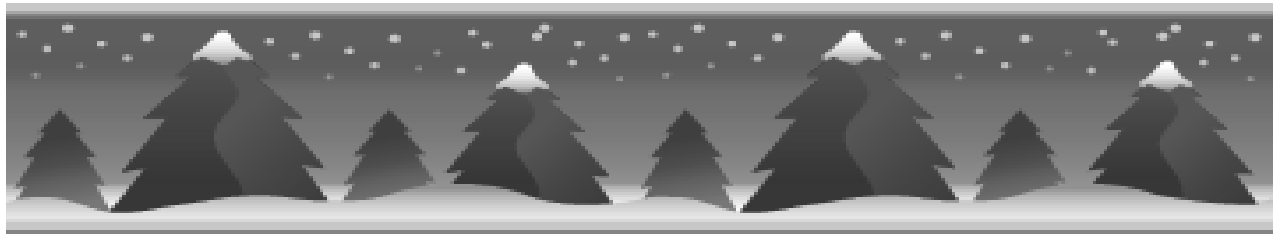
For Question 11, please describe the extent to which you agree or disagree with the following statement regarding the recreational importance of trees and forests.

[illegible]

Please list the outdoor recreation activities that you currently do or have ever done around trees and forests:

Question 12

Question 12	Disagree	Agree	No Difference	Don't Know
1. There are fewer jobs associated with trees and forests	☐	☐	☐	☐
2. There is an increase in pollution around trees and forests	☐	☐	☐	☐
3. There are more trees and forests	☐	☐	☐	☐
4. There are positive changes in forest policies or laws	☐	☐	☐	☐
5. I interact more with trees and forests	☐	☐	☐	☐
6. I interact with trees and forests differently	☐	☐	☐	☐



Question 13

[illegible]

People sometimes have negative feelings about trees and forests. Question 14 asks about ways in which you might feel negatively about trees and forests. Please describe the extent to which you agree or disagree with the following statements.

Question 14	1	2	3	4	5	6
	Strongly Disagree		Neutral		Strongly Agree	Don't Know
1. Trees may damage my house	☐	☐	☐	☐	☐	☐
2. Trees may damage the sidewalk	☐	☐	☐	☐	☐	☐
3. There are always insects and spiders around trees	☐	☐	☐	☐	☐	☐
4. Trees may bring animal pests	☐	☐	☐	☐	☐	☐
5. I am allergic to trees or other plants near trees	☐	☐	☐	☐	☐	☐
6. I don't like how trees and forests are managed	☐	☐	☐	☐	☐	☐
7. I do not feel welcome in forests or areas where there are trees, such as parks	☐	☐	☐	☐	☐	☐
8. I have a safety concern when I am near trees or forests	☐	☐	☐	☐	☐	☐
9. I feel the positive benefits of trees are greater than the negative aspects	☐	☐	☐	☐	☐	☐

Please add any additional thoughts or comments here:

Demographic Information

*For statistical purposes, we need to ask you a few demographic questions.
Please remember that the information you provide is confidential!*

15. What year were you born?

1 9

16. What is your gender?

17. Are you of Hispanic, Latino or Spanish descent?

- ☐ Yes --If yes, from which country--
☐ No

18. What is your ethnicity?

- ☐ American Indian ☐ Asian
☐ Black/African American ☐ White/Caucasian
☐ Other

19. What is your marital status?

- ☐ Single ☐ Divorced ☐ Other _____
☐ Married ☐ Widowed

20. What is your highest degree or level of school completed?

- ☐ Did not complete high school ☐ Associate degree
☐ High School Diploma or GED ☐ Bachelor degree
☐ Some college, but no degree ☐ Graduate or professional degree
☐ Other

21. Please check the box that corresponds to your income for 2013.

- ☐ Less than \$14,999 ☐ \$25,000- \$34,999 ☐ \$75,000- \$99,999
☐ \$15,000 to \$19,999 ☐ \$35,000- \$49,999 ☐ \$100,000- \$149,999
☐ \$20,000 to \$24,999 ☐ \$50,000- \$74,999 ☐ \$150,000 or more

22. Please check the box that best describes your current employment status:

- ☐ I work part time ☐ I am unemployed
☐ I work full time ☐ I am retired

23. We would like to follow up with the participants in this study. Would you be willing to participate in an interview or focus group session about this research? (Your continued participation will enter you in an additional drawing for a \$25 Visa Gift Card) **If yes, please write your name and the best way to contact you:**

APPENDIX II:

Pre-notice letter

<date>

<Inside Address>

Dear Lansing Resident,

We are writing to ask your help with an important study being conducted by Michigan State University to understand the many ways in which trees and forests are important to people. The best way we have of learning about this topic is by asking all different kinds of people to share their thoughts and opinions. In the next few days you will receive a request to participate in this project by answering questions about your perceptions of how and why trees are (or are not) important to you personally, and to your community.

We would like to do everything we can to make it easy and enjoyable for you to participate in the study. We are writing in advance because many people like to know ahead of time that they will be asked to fill out a questionnaire. This research can only be successful with the generous help of people like you.

To say thanks, in exchange for your completed survey, you will be entered into a drawing to win a \$25 VISA gift card. Several study participants will be randomly chosen to receive this gift card token of appreciation. I hope you will take 15-20 minutes of your valuable time to help us. Most of all, I hope that you enjoy the questionnaire and the opportunity to voice your thoughts and opinions about how trees and forests are important.

Respectfully,

Dr. Maureen McDonough
Professor & Research
Department of Forestry

Dori Pynnonen Hopkins, M.S.
Researcher & Doctoral Candidate
Department of Forestry

APPENDIX III:

Informed Consent

Consent to Participate In An Interview

Title: Just and equitable access: Developing and testing a methodology that represents diverse perceptions on the importance of forests.

Description

The objectives of this research study are to identify the ways in which trees and forests are personally and socially important to people, and what motivates citizens to participate in research about trees and forests. We are contacting specific groups of people that are often left unheard in the natural resource decision-making process to participate in an evaluative interview on this topic. Your input is crucial to the development of social indicators in sustainable forest management

Risks and Benefits:

There are no serious risks to you from participating in this interview (see confidentiality statement). One benefit is that your ideas will contribute to a better understanding of the importance of forests to all types of people as well as contribute to the use of more inclusive research methods. Your suggestions are necessary in order to improve sustainable natural resource management.

Time Commitment, Cost and Payments:

The interview will take about 30 minutes to complete. There are no other costs to you for helping us with this study. If you choose, your name may be entered a second time into the drawing for one of \$25 Visa Gift Cards.

Confidentiality:

Although we will record our discussion, we will not put your name on the audio file or transcript. The only information that will be on the file will be a code number, which will be stored in a separate location from the interview material. Therefore, we do not believe that you can be identified. Your privacy will be protected to the maximum extent allowable by law.

Right to Withdraw:

Participation in this study is voluntary. You may choose not to participate at all. Furthermore, you may refuse to answer certain questions. If you begin, you may discontinue your participation at any time.

Contact Information:

If you have any questions about this study, please contact the **Principal Investigator** Maureen McDonough at 126 Natural Resources Building, Michigan State University, East Lansing, MI 48824, phone (517) 432-2293, e-mail mcdono10@msu.edu. If you have questions about your role and rights as a research participant, or would like to register a complaint about this study, you may contact, anonymously if you wish, the Director of MSU's Human Research Protection Programs, Kristen Burt, by phone: (517) 355-2180, fax: (517) 432-4503, email: <irb@msu.edu>, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

Statement of Consent:

I voluntarily agree to participate in the study.

Signature..... Date

I also consent to be recorded for this study:

Signature..... Date

Signature of Investigator:..... Date

APPENDIX IV:

Script for evaluative focus group/interviews

Script for Evaluative Focus Groups/Interviews

Greet participant(s).

Thank you for agreeing to participate in an interview to evaluate the research with which you participated on the importance of trees and forests to people. Oftentimes, the vast majority of people that participate in natural resources-related research are white, middle-aged, middle- to upper-class males. However, the United States is an extremely diverse country and the research concerning natural resources management needs to reflect this diversity. Through our discussion today, I hope to learn more about what prompted *you* to participate in the survey research, what you liked (and didn't like) about the research itself, and any tips you would like to provide for future research on this topic. The information we receive from you will be very useful to natural resource policy- and decision-makers as well as those interested in more inclusive research methods.

Before we begin, I need to have you read and sign a form giving your consent to participate and be recorded. The consent form describes the purpose of the interview, risks and benefits to you, time commitment, how we maintain confidentiality and your right to withdraw at any time. Your signed consent is required by law and enforced by Michigan State University.

Collect signed consent form. Turn on the digital recorders.

What do you like about living in Lansing?

What do you like about trees and forests? What don't you like about trees and forests?

Did you receive the survey on the importance of trees and forests in the mail? Or did you receive the survey in-person?

What motivated you to complete the survey on the importance of trees and forests to people?

Have you completed other surveys in the past? Did you receive the surveys in the mail or in-person? How do you decide whether or not you will complete a survey?

Were there any aspects of the survey on the importance of trees and forests that were especially interesting to you? Were there any aspects that were especially disinteresting? Were there aspects that were especially relevant or irrelevant?

How can survey research on topics such as the importance of trees and forests be improved? Are there particular methods that you think are more user-friendly than others?

Do you have any “tips” for future research on the importance of trees and forest to people?

Do you have any other questions or comments about this topic?

Thank them for their time.

APPENDIX V:

Non-response survey

If you agree to consent to participate in this study, I will begin the questions.

I am going to ask you about a variety of ways that trees and forests may or may not be important to you. Please describe the extent to which you agree or disagree with the following questions.

Question	1	2	3	4	5	6
	←————→					
	Strongly Disagree		Neutral		Strongly Agree	Don't Know
1. Trees provide clean air	☐	☐	☐	☐	☐	☐
2. Trees clean and filter water	☐	☐	☐	☐	☐	☐
3. Trees provide shelter for wildlife	☐	☐	☐	☐	☐	☐
4. Trees and forests are important for their economic value, such as providing jobs or financial benefits.	☐	☐	☐	☐	☐	☐
5. Trees and forests have cultural importance, such as ties to a community.	☐	☐	☐	☐	☐	☐
6. Trees provide educational value, such as helping us to learn about nature.	☐	☐	☐	☐	☐	☐
7. Trees and forests provide a place for “escape” or to “get away” (they are relaxing).	☐	☐	☐	☐	☐	☐
8. Trees add beauty to parks and neighborhoods.	☐	☐	☐	☐	☐	☐
9. Trees are important for providing paper products, building materials, and other resources.	☐	☐	☐	☐	☐	☐
10. I feel a connection to a specific tree, trees, or a particular forest.	☐	☐	☐	☐	☐	☐
11. Trees are connected to religious or spiritual feelings for me.	☐	☐	☐	☐	☐	☐
12. Trees are important for outdoor recreations.	☐	☐	☐	☐	☐	☐

REFERENCES

REFERENCES

- Agresti, A. and Finlay, B. 1997. *Statistical methods for the Social Sciences*, 3rd Ed. Upper Saddle River, NJ: Prentice Hall.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Allison, T. Maria, (1992). Fostering cultural diversity: Problems of access and ethnic boundary maintenance. *Proceedings of the Symposium on Social Aspects and Recreation Research*, February 19-22, Ontario, California. USDA Forest Service Gen. Tec. Rep. PSW-132. pp 22-24.
- Alreck, P.L., & Settle, R.B. (2004). *The survey research handbook*, 3rd Ed. New York, NY: McGraw-Hill/Irwin
- Anthony, M., Knuth, B., & Lauber, T.B. (2004). Gender and citizen participation in wildlife management decision making. *Society and Natural Resources*, 17(5), 395-411. doi:10.1080/08941920490430179
- Arcury, T., & Christianson, E. (1990). Environmental worldview in response to environmental problems. *Environment and Behavior*, 22(3), 387-407. doi:10.1177/0013916590223004
- Arcury, T., Johnson, T., & Scollay, S. (1986). Ecological worldview and environmental knowledge: The "New Environmental Paradigm." *Journal of Environmental Education*, 17(4), 35-40. doi:10.1080/00958964.1986.9941424
- Babbie, E. (2005). *The basics of social research*, 3rd Ed. Belmont, CA: Wadsworth.
- Bell, S.E., & Braun, Y.A. (2010). Coal, identity, and the gendering of environmental justice activism in central Appalachia. *Gender & Society*, 24(6), 794-813. doi:10.1177/0891243210387277
- Berland, A., Schwarz, K., Herrmann, D.L., & Hopton, M.E. (2015). How environmental justice patterns are shaped by place: Terrain and tree canopy in Cincinnati, Ohio, USA. *Cities and the Environment*, 8(1), article 1. Available at: <http://digitalcommons.lmu.edu/cate/vol8/iss1/1/>
- Bradley, S. H. (2011). *Outdoor girls: Incorporating an ongoing connection with the outdoors into the prevention of negative body image in girls* (Unpublished master's thesis). Texas Woman's University, Denton, TX.

- Brown, P. J. (1984). Benefits of outdoor recreation and some ideas for valuing recreation opportunities. In G.L. Peterson and A. Randall (Eds.), *Valuation of wildland resource benefits* (pp. 209-220). Boulder, CO: Westview Press.
- Burns, N., Schlozman, K.L., & Verba, S. (2009). *The private roots of public action: Gender, equality, and political participation*. Cambridge, MA: Harvard University Press.
- Carroll, M.S., Lee, R.G., & McLain, R.J. (2005). Occupational community and forest work: Three cases from the Pacific Northwest. In R.G. Lee and D.R. Field (Eds), *Communities and forests: Where people meet the land*, (pp 159-175). Corvallis, OR: Oregon State University Press.
- Castleden, H., Garvin, T., & Nation, H.F. (2009). “Hishuk Tsawak” (Everything is one/connected): A Huu-ay-aht worldview for seeing forestry in British Columbia, Canada. *Society & Natural Resources*, 22(9), 789–804.
doi: 10.1080/08941920802098198
- Chavez, D.J. (1993). The wildland/urban interface: Hispanics in the national forests. In P.H.Gobster (Eds.), *Managing urban and high-use recreation settings*. (Gen. Tech. Rep. NC-163, 107-110). St. Paul, MN: USDA Forest Service, North Central Forest Experiment Station.
- Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and Urban Planning*, 68(1), 129-138. doi:10.1016/j.landurbplan.2003.08.003
- Clark, T.W. (2002). *The policy process: A practical guide for natural resource professionals*. New Haven, CT: Yale University Press.
- Collins, K.S., Hall, A.H., & Neuhaus, C. (1999). U.S. minority health: A chartbook. The Commonwealth Fund. Retrieved July 28, 2012 from:
http://www.commonwealthfund.org/usr_doc/collins_usminority.pdf
- Creswell, J.W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*, 3rd Edition. Thousand Oaks, CA: Sage.
- Curtin, R., Presser, S., & Singer, E. (2000). The effects of response rate changes on the index of consumer sentiment. *Public Opinion Quarterly*, 64(4), 413–428. doi: 10.1086/318638
- Dandy, N. & Van Der Wal, R. (2011). Shared appreciation of woodland landscapes by land management professionals and lay people: An exploration through field-based interactive photo-elicitation. *Landscape and Urban Planning*, 102(1), 43-53.
doi:10.1016/j.landurbplan.2011.03.008

- Derr, V. (2001). *Growing up in the Hispano homeland: The interplay of nature, family, culture, and community in shaping children's experiences and sense of place*. (Doctoral dissertation). School of Forestry and Environmental Studies, Yale University: New Haven.
- de Leeuw, W.D., Hox, J.J., & Dillman, D.A. (2008). *International Handbook of Survey Methodology*. New York, NY: Lawrence Erlbaum Associates.
- DeVault, M.L. (1999). *Liberating Method: Feminism and Social Research*. Philadelphia, PA: Temple University Press.
- Dietz, T., Kalof, L., & Stern, P.C. (2002). Gender, values, and environmentalism. *Social Science Quarterly*, 83, 353-364. doi: 10.1111/1540-6237.00088
- Dillman, D.A., Smyth, J.D., & Christian, L.M. (2009a). *Internet, mail, and mixed-mode surveys: The tailored design method, 3rd Ed*. Hoboken, NJ: John Wiley and Sons.
- Dillman, D.A., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J., & Messer, B.L. (2009b). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the internet. *Social Science Research*, 39, 1-18. doi:10.1016/j.ssresearch.2008.03.007
- DiSogra, C., Dennis, M., & Fahimi, M. (2010). On the quality of ancillary data available for address-based sampling. *Proceedings of the American Statistical Association*, Section on Survey Research Methods, 4174-83.
- Donovan, G.H. & Mills, J. (2014). Environmental justice and factors that influence participation in tree planting programs in Portland, Oregon, U.S. *Arboriculture & Urban Forestry*, 30(2), 70-77. http://actrees.org/files/Events/donovan_and_millsenvironmentaljustice.pdf
- Driver, B. L., Brown, J. P., & Peterson, G.L. (1991). *Benefits of Leisure*. State College, PA: Venture Publishing.
- Driver, B. L., Nash, R., & Haas, G. (1987). Wilderness benefits: A state-of-knowledge review. Proceedings from the National Wilderness Research Conference: Issues, state-of-knowledge, future directions '87. Ogden, UT.
- Duerden, M. D., Taniguchi, S., & Widmer, M. (2012). Antecedents of identity development in a structured recreation setting: A qualitative inquiry. *Journal of Adolescent Research*, 27(2), 183-202. doi:10.1177/0743558411417869
- Dutcher, D.D., Finley, J.C., Luloff, A.E., & Johnson, J.B. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behavior*, 39(4): 474-493. doi:10.1177/0013916505283421

- Feilzer, M.Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6-16. doi:10.1177/1558689809349691
- Feldman, S., Radermacher, H., Browning, C., Bird, S., & Thomas, S. (2008). Challenges of Recruitment and Retention of Older People from Culturally Diverse Communities in Research. *Ageing and Society*, 28(4), 473-493. doi:10.1017/S0144686X07006976
- Flocks, J., Escobedo, F., Wade, J., Varela, S., & Wald, C. (2011). Environmental justice implications of urban tree cover in Miami-Dade County, Florida. *Environmental Justice*, 4(2), 125-134. doi:10.1089/env.2010.0018
- Flood, P. J. & McAvoy, L.H. (2007). Voices of my ancestors, their bones talk to me: How to balance US Forest Service rules and regulations with traditional values and vulture of American Indians. *Human Ecology Review*, Society of human Ecology Vol. 14, No. 1, pp 76-88. <http://www.humanecologyreview.org/pastissues/her141/floodandmcavoy.pdf>
- Fonow, M.M. & Cook, J.A. (1991). A look at the second wave of feminist epistemology and methodology. In M.M. Fonow & J.A. Cook (Eds.), *Beyond methodology: Feminist scholarship as lived research*, Bloomington & Indianapolis, IN: Indiana University Press.
- Ford, R. M., Williams, K. J. H., Smith, E. L., & Bishop, I. D. (2014). Beauty, belief, and trust: Toward a model of psychological processes in public acceptance of forest management. *Environment and Behavior*, 46(4), 476–506. doi:10.1177/0013916512456023
- Frost, R. (1916). Tree at my window. In R. Frost * L. Untermeyer (Eds.), *Robert Frost's Poems*, New York, NY: St. Martin's Press.
- Garber, M., & Arnold, R.M. (2006). Promoting the participation of minorities in research. *The American Journal of Bioethics*, 6(3): w14-w20. doi:10.1080/15265160600686331
- George, D. & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.)*. Boston, MA: Allyn & Bacon.
- Glowacka, M., Washburn, D., & Richland, J. (2009). Nuvatukya'ovi, San Francisco peaks: Balancing western economies with Native American spiritualities. *Current Anthropology*, 50(4), 547–561. doi:10.1086/599069
- Gordon, J., Barton, A., & Adams, K. (2013). An exploration of African American forest landowners in Mississippi. *Rural Sociology*, 78(4), 473-497. doi: 10.1111/ruso.12014
- Groves, R.M., & Peytcheva, E. (2008). The impact of nonresponse rates on nonresponse bias: A meta-analysis. *Public Opinion Quarterly*. 72(2): 167-189. doi:10.1093/poq/nfn011

- Grumbine, R.E. (1994). What is ecosystem management? *Conservation Biology*, 8(1): 27-38
doi:10.1046/j.1523-1739.1994.08010027.x
- Gustafson, P. (2001). Meanings of place: Everyday experience and theoretical conceptualizations. *Journal of Environmental Psychology*, 21(1), 5-16.
doi:10.1006/jevp.2000.0185
- Hamilton, E. (2012). Non-timber forest products in British Columbia: Policies, practices, opportunities, and recommendations. *Journal of Ecosystems and Management*, 13(2), 1–24. <http://jem.forrex.org/index.php/jem/article/viewFile/165/111>
- Hammitt, W.E. (2000). The relation between being away and privacy in urban forest recreation environments. *Environment and Behavior*, 32(4), 521-540.
doi:10.1177/00139160021972649
- Harding, S. (1991). *Whose science? Whose knowledge?: Thinking from women's lives*. Ithaca, NY: Cornell University Press.
- Harding, S. (2001). Feminist standpoint epistemology. In M. Lederman and I. Bartsch (Eds.), (pp 145-168). *The gender and science reader*. London and New York: Routledge.
- Harshaw, H.W., & Tindall, D.B. (2005). Social structure, identities, and values: a network approach to understanding people's relationships to forests. *Journal of Leisure Research*, 37(4), 426-449.
<http://socialnetworks.soci.ubc.ca/SocNets/DavidTindall/Files/Tindall%20-%20Social%20Structure.pdf>
- Hauru, K., Koskinen, S., Kotze, D.J., & Lehvävirta, S. (2014). The effects of decaying logs on the aesthetic experience and acceptability of urban forests – Implications for forest management. *Landscape and Urban Planning* 123, 114-123.
doi:10.1016/j.landurbplan.2013.12.014
- Heerwagen, J. H. & Orians, G.H. (1993). Humans, habitats, and aesthetics. In Kellert, S.R. & Wilson, E.O. (Eds.). (pp 138-172). *The biophilia hypothesis*. Washington, D.C.: Island Press/Shearwater Books.
- Hodgkin, S. (2008). Telling it all: A story of women's social capital using a mixed methods approach. *Journal of Mixed Methods Research*, 2(4), 296-316.
doi:10.1177/1558689808321641
- Hunter, L.M., Hatch, A., & Johnson, A. (2004). Cross-national gender variation in environmental behaviors. *Social Science Quarterly*, 85, 677-694. doi:10.1111/j.0038-4941.2004.00239.x

- Iannacchione, V.G. (2011). The changing role of address-based sampling in survey research. *Public Opinion Quarterly*, 75(3), 556-575. doi:10.1093/poq/nfr017
- Jayarante, T.E., and Stewart, A.J. (1991). Quantitative and qualitative methods in the social sciences: Current feminist issues and practical strategies. In M.M. Fonow & J.A. Cook (Eds.), *Beyond methodology: Feminist scholarship as lived research*. Bloomington and Indianapolis, IN: Indiana University Press.
- Jennings, V., Johnson Gaither, C., Schulerbrandt Gragg, R. (2012). Promoting environmental justice through urban green space access: A synopsis. *Environmental Justice*, 5(1), 1-7. doi:10.1089/env.2011.0007
- Johnson, C.Y., Bowker, J., Green, G., and Cordell, H. (2007). "Provide it... but will they come?": A look at African American and Hispanic visits to federal recreation areas. *Journal of Forestry*, 105(5), 257-265. <http://www.srs.fs.usda.gov/pubs/28797>
- Jorgensen, B.S. & Stedman, R.C. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, 21(3), 233-248. doi:10.1006/jevp.2001.0226
- Kaalund, V.A. (2004). Witness to truth: Black women heeding the call for environmental justice. In R. Stein (Ed.), *New Perspectives on Environmental Justice*. (pp 78-92). New Brunswick, NJ: Rutgers University Press.
- Kals, E., Schumacher, D., & Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31(2), 178-2002. doi: 10.1177/00139169921972056
- Kamitsis, I., & Francis, A. J. P. (2013). Spirituality mediates the relationship between engagement with nature and psychological wellbeing. *Journal of Environmental Psychology*, 36, 136–143. doi:10.1016/j.jenvp.2013.07.013
- Kaplan, S. & Talbot, J. (1983). Psychological benefits of a wilderness experience. In I. Altman & J. Wohlwill (Eds.). *Behavior and the natural environment*. New York, NY: Plenum Press.
- Kaplan, S. (1987). Aesthetics, affect, and cognition: Environmental preference from an evolutionary perspective. *Environment and Behavior*, 19(1), 3-32. doi:10.1177/0013916587191001
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15, 169-182. http://is.muni.cz/el/1423/jaro2014/HEN597/um/47510652/Kaplan__S._1995.pdf

- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York, NY: Cambridge University Press.
- Kellert, S.R. (1984). Attitudes toward animals: Age-related development among children. In M.W. Fox & L.D. Mickley (Eds.), *Advances in animal welfare science 1984/85* (pp 43-60). Washington, DC: The Humane Society of the United States.
- Kellert, S.R. (1996). *The value of life: Biological diversity and human society*. Washington, D.C.: Island Press.
- Kellert, S.R. (1997). Kinship to mastery: Biophilia in human evolution and development. Washington, D.C.: Island Press/Shearwater Books.
- Kellert, S.R. (2012). *Birthright: People and nature in the modern world*. New Haven and London: Yale University Press.
- Kempton, W., Boster, J.S., & Hartley, J.A. (1995). *Environmental Values in American Culture*. Cambridge, MA: The MIT Press.
- Kil, N., Holland, S. M., & Stein, T. V. (2014). Place Meanings and Participatory Planning Intentions, *Society & Natural Resources: An International Journal*, 27(5), 475-491. doi:10.1080/08941920.2013.842274
- Kirsch, G.A. (1999). *Ethical Dilemmas in Feminist Research*. Albany, NY: State University of New York Press.
- Knap, N.E., & Propst, D.B. (2001). Focus group interviews as an alternative to traditional survey methods for recreation needs assessments. *Journal of Park and Recreation Administration*, 19(2), 62-84. <http://js.sagamorepub.com/jpra/article/view/1577>
- Kovacs, Z.I., LeRoy, C.J., Fischer, D.G., Lubarsky, S., & Burke, W. (2006). How do aesthetics affect our ecology? *Journal of Ecological Anthropology*. 10, 61-65. <http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1049&context=jea>
- Krueger, R.A. (1994). *Focus Group Interviews: A Practical Guide for Applied Research*, 2nd Edition. Thousand Oaks, CA: Sage.
- Krueger, R.A. & Casey, M.A. (2000). *Focus Group Interviews: A Practical Guide for Applied Research*, 3rd Edition. Thousand Oaks, CA: Sage.
- Kruger, L.E. (2003). *Understanding community-forest relations*. (General Technical Report PNW-GTR 566). Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

- Kuhns, M.R., Bragg, H.A., & Blahna, D.J. (2002). Involvement of women and minorities in the urban forestry profession. *Journal of Arboriculture*, 28(1), 27-34.
[https://forestry.usu.edu/files/uploads/Research%20Pubs/JofA28\(1\)W&M1.pdf](https://forestry.usu.edu/files/uploads/Research%20Pubs/JofA28(1)W&M1.pdf)
- Kwak, N. & Radler, B. (2002). A comparison between mail and web surveys: response pattern, respondent profile, and data quality. *Journal of Official Statistics*, 18(2), 257-273.
<http://www.barold.com/www/JOS%20article.pdf>
- LaVelle, J.P. (2001). Rescuing Paha Sapa: Achieving environmental justice by restoring the great grasslands and returning the sacred Black Hills to the Great Sioux Nation. *Great Plains Natural Resources Journal*, 40, 41-100.
- Leatherberry, E.C. (2000). An overview of African American's historical, religious, and spiritual ties to forests. *Proceeding of the American Society of Foresters 1999 National Convention* (Portland, OR 11-15 Sep 1999), 452-457.
- Li, C., Wang, C., Liu, S., & Weng, L. (2010). Forest value orientations and importance of forest recreation services. *Journal of Environmental Management*, 91(11), 2342-2348.
doi: 10.1016/j.jenvman.2010.06.020
- Link, M.W., Battaglia, M.P., Frankel, M.R., Osborn, L., & Mokdad, A.H. (2008). A comparison of address-based sampling (ABS) versus random digit dialing (RDD) for general population surveys. *Public Opinion Quarterly*, 72(1), 6-27. doi: 10.1093/poq/nfn003
- Liu, J., Ouyang, Z., & Miao, H. (2010). Environmental attitudes of stakeholders and their perceptions regarding protected area-community conflicts: A case study in China. *Journal of Environmental Management* 91(11), 2254-2262.
doi:10.1016/j.jenvman.2010.06.007
- Lohr, S. (1999). *Sampling: Data and analysis*. Pacific Grove, CA: Brooks/Cole Publishing Co.
- Lutts, R. (1992). The trouble with Bambi: Walt Disney's Bambi and the American vision of nature. *Forest & Conservation History*, 36(4), 160-171. doi: 10.2307/3983677
- Manfredo, M.J. & Driver, B.L. (1996). Measuring leisure motivation: a meta-analysis of the recreation preference scales. *Journal of Leisure Research*, 28(3), 188-213.
[http://www.researchgate.net/publication/250614022_Measuring_leisure_motivation_a_eta_analysis_of_the_Recreation_Experience_Preference_Scales](http://www.researchgate.net/publication/250614022_Measuring_leisure_motivation_a_meta_analysis_of_the_Recreation_Experience_Preference_Scales)
- Manning, R., Valliere, W., & Minter, B. (1999). Values, ethics, and attitudes toward national forest management: An empirical study. *Society and Natural Resources*. 12:421-436.
doi:10.1080/089419299279515

- McCright, A.M. & Xiao, C. (2014). Gender and Environmental Concern: Insights from Recent Work and for Future Research. *Society and Natural Resources*, 27(10), 1109-1113. doi:10.1080/08941920.2014.918235
- McDonough, M.H. (2003). Understanding the meaning and value of trees. In Kruger, L.E. (tech. ed.) *Understanding community-forest relations*. Gen. Tech. Rep. PNW-GTR-566. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- McDonough, M.H., Russell, K., Burban, L., & Nancarrow, L., (2003). Dialogue on diversity: Broadening the voices in urban and community forestry. NA-IN-04-03, USDA Forest Service, Urban and Community Forestry Program, Northeastern Area. <http://www.nrs.fs.fed.us/pubs/8567>
- McLean, C.A., & Campbell, C.M. (2003). Locating research informants in a multi-ethnic community: Ethnic identities, social networks and recruitment methods. *Ethnicity and Health*, 8(1), 41-61. doi:10.1080/13557850303558
- McMillan, M.B., Hoban, T.J., Clifford, W.B., & Brant, M.R. (1997). Social and demographic influences on environmental attitudes. *Southern Rural Sociology*, 13(1), 89-107. <http://www.ag.auburn.edu/auxiliary/srsa/pages/Articles/SRS%201997%2013/SRS%201997%2013%2089-107.pdf>
- Meinig, D.W. (1976). The beholding eye: Ten versions on the same scene. *Landscape Architecture*, 66, 47-54. <http://student.agsci.colostate.edu/rdfiscus/tenviews.pdf>
- Meraji, S.M. (Narrator). (2015, July 12). Outdoor afro: Busting stereotypes that black people don't hike or camp. In P. Breslow (Senior Producer), *Weekend Edition Sunday*. Washington DC: National Public Radio.
- Mertens, D.M. (2007). Transformative paradigm: Mixed methods and social justice. *Journal of Mixed Methods Research*, 1(3), 212-225. doi:10.1177/1558689807302811
- Milbrath, L. (1984). *Environmentalists: Vanguard for a New Society*. Albany, NY: State University of New York Press.
- Millennium Ecosystem Assessment (MEA). (2005). Ecosystems and human well-being: Synthesis. Washington, D.C.: Island Press. <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>
- Mitchell, D., & Hobby, T. (2010). From rotations to revolutions: Non-timber forest products and the new world of forest management. *BC Journal of Ecosystems and Management*, 11(1&2), 27-38. <http://jem.forrex.org/index.php/jem/article/view/58/22>

- Moore, D.L. & Tarnai, J. (2002). Evaluating nonresponse error in mail surveys. In: Groves, R. M., Dillman, D. A., Eltinge, J. L., and Little, R. J. A. (eds.), *Survey Nonresponse* (pp. 197–211), New York, NY: John Wiley & Sons.
- Morrissey, J., & Manning, R. (2000). Race, residence and environmental concern: New Englanders and the White Mountain National Forest. *Human Ecology Review*, 7(1), 12-24. https://www.uvm.edu/parkstudieslaboratory/publications/Race_Residence_and.pdf
- Murphy, B.L., Chretien A.R., & Brown L.J. (2012). Non-timber forest products, maple syrup and climate change. *Journal of Rural and Community Development*, 7(3), 42–64.
- Nakau, M., Imanishi, J., Imanishi, J., Watanabe, S., Imanishi, A., Baba, T., & Morimoto, Y. (2013). Spiritual care of cancer patients by integrated medicine in urban green space: A pilot study. *Explore: The Journal of Science and Healing*, 9(2), 87-90. doi:10.1016/j.explore.2012.12.002
- Nightingale, A. (2003). A feminist in the forest: Situated knowledges and mixing methods in natural resource management. *ACME: An International E-Journal for Critical Geographies*, 2(1), 77-90. <http://www.geos.ed.ac.uk/homes/rgroves/nightingalepub3.pdf>
- Norton, C. L. (2010). Into the wilderness—A case study: The psychodynamics of adolescent depression and the need for a holistic intervention. *Clinical Social Work Journal*, 38(2), 226-235. doi:10.1007/s10615-009-0205-5
- Norton, C. L., Tucker, A., Russell, K. C., Bettmann, J. E., Gass, M. A., Gillis, H. L., & Behrens, E. (2014). Adventure therapy with youth. *Journal of Experiential Education*, 37(1), 46–59. doi:10.1177/1053825913518895
- O'Brien, W. E. & Njambi, W. N. (2012). Marginal voices in “wild” America: Race, ethnicity, gender, and “nature” in the national parks. *The Journal of American Culture*, 35.1, 15-25. doi:10.1111/j.1542-734X.2011.00794.x
- Orians, G. H. (1980). Habitat selection: General theory and applications to human behavior. In J.S. Lockard (ed.). *The evolution of human social behavior*. New York, NY: Elsevier.
- Orians, G.H. (1986). An ecological and evolutionary approach to landscape aesthetics. In E. C. Penning-Roswell & D. Lowenthal (eds). London, UK: Allen and Unwin.
- Ortman, J.M. & Guarneri, C.E. (2009). *United States Population Projections: 2000 to 2050 Online July 28, 2012*. Retrieved from: <http://www.census.gov/population/www/projections/analytical-document09.pdf>

- Parker, J.D. & McDonough, M.H. (1999). Environmentalism of African Americans: An analysis of the subculture and barriers theories. *Environmental and Behavior*, 31(2), pp. 155-177. doi:10.1177/00139169921972047
- Patel, A., Rapport, D.J., VanDerlinden, L., & Eyles, J. (1999). Forests and societal values: Comparing scientific and public perception of forest health. *Environmentalists*, 19(3), 239-249. doi:10.1023/A:1026402812084
- Patton, M.Q. (2002). *Qualitative Research and Evaluative Methods, 3rd Edition*. Thousand Oaks, CA: Sage.
- Pearsall, H., and Pierce, J. (2010). Urban sustainability and environmental justice: evaluating the linkages in public planning/policy discourse. *Local Environment*, 14 (6), 569-580. doi:10.1080/13549839.2010.487528
- Pemberton, R. (1985). I saw that it was holy: the Black Hills and the concept of sacred land. *Law and Inequality: A Journal of Theory and Practice* 3, 287-342.
- Perkins, H. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, 30, 455-463. doi:10.1016/j.jenvp.2010.05.004
- Pinchot Institute for Conservation. (2006). Advancing sustainable forest management in the United States. V.A. Sample, S.I. Kavanaugh, & M.M. Snieckus (Eds). Washington, D.C. <http://www.pinchot.org/pubs/10>
- Poe, M.R., McLain, R.J., Emery, M. & Hurley, P.T. (2013). Urban forest justice and the rights to wild foods, medicines, and materials in the city. *Human Ecology*, 41, 409-422. doi:10.1007/s10745-013-9572-1
- Power, T.M. (1980). *The Economic Value of the Quality of Life*. Boulder, CO: Westview Press, Inc.
- Prindeville, D.M. (2004). The role of gender, race/ethnicity, and class in activists' perceptions of environmental justice. In. R. Stein (Ed.), *New Perspectives on Environmental Justice* (pp. 93-108). New Brunswick, NJ: Rutgers University Press.
- Propst, D.B., & Koesler, R.A. (1998). Bandura goes outdoors: Role of self-efficacy in the outdoor leadership development process. *Leisure Sciences*, 20(4), 319-344. doi:10.1080/01490409809512289
- Pynnonen Hopkins, D., McDonough, M.H., and Blaha, R. (2014). A literature review on the importance of trees and forests. Report prepared for USDA Forests Service.
- Quantz, J.O. (1898). Dendro-psychoses. *The American Journal of Psychology*, 9(4), 449-506. doi:10.2307/1412187

- Reed, P.S., Foley, K.L., Hatch, J., & Mutran, E.J. (2003). Recruitment of Older African Americans for Survey Research: A Process Evaluation of the Community and Church Based Strategy in the Durham Elders Project. *The Gerontologist*, 43(1), 52-61. doi:10.1093/geront/43.1.52
- Reinharz, S. (1992). *Feminist Methods in Social Research*. London & New York: Oxford University Press.
- Richard, T. & Burns, S. (1999). The Ponderosa Pine Forest Partnership: Forging new relationships to restore a forest. Office of Community Services, Fort Lewis College, Durango, Colorado.
- Roberts, N. S. & Chitewere, T. (2011). Speaking of justice: Exploring ethnic minority perspectives of the Golden Gate Recreation Area. *Environmental Practice*, 13(4), 354-369. doi: <http://dx.doi.org/10.1017/S1466046611000378>
- Rokeach, M. (1968). Beliefs, attitudes and values: A theory of organization and change. San Francisco, CA: Jossey-Bass.
- Rokeach, M. (1973). *The Nature of Human Values*. New York, NY: The Free Press.
- Rolston, H. III. (1998). Human values and natural systems. *Society and Natural Resources*, 1(1), 269-283. doi:10.1080/08941928809380658
- Satterfield, T. (2001). In search of value literacy: Suggestions for the elicitation of environmental values. *Environmental Values*, 10(3), 331-359. <http://www.jstor.org/stable/30301824>
- Saunders, C.D., A.T. Brooks, O.E. Myers, Jr. (2006). Using psychology to save biodiversity and human well-being. *Conservation Biology*, 20(3), 702-705. doi:10.1111/j.1523-1739.2006.00435.x
- Saxon, D., Garratt, D., Gilroy P., & Cairns C. (2003). Collecting data in the Information Age. *Research in Education*, 51.
- Shellman, A. (2014). Empowerment and experiential education: A state of knowledge paper. *Journal of Experiential Education*, 37(1), 18-30. doi:10.1177/1053825913518896
- Shin, W.S., Shin, C.S., & Yeoun, P.S. (2012). The influence of forest therapy camp on depression in alcoholics. *Environmental Health and Preventive Medicine*, 17(1), 73-76. doi: 10.1007/s12199-011-0215-0
- Shindler, B., L.A. Cramer. (1999). Shifting public values for forest management: Making sense of wicked problems. *Western Journal of Applied Forestry*, 14(1), 28-34. <http://andrewsforest.oregonstate.edu/pubs/pdf/pub2465.pdf>

- Singer, E., van Hoewyk, J., & Maher, M.P. (2000). Experiments with incentives in telephone surveys. *Public Opinion Quarterly*, 64(2), 171–188. doi: 10.1086/317761
- Smith, P.D., and McDonough, M.H. (2001). Beyond public participation: Fairness in natural resource decision making. *Society and Natural Resources*. 14(3), 239-249. doi:10.1080/08941920120140
- Spartz, J. T. & Shaw, B. R. (2011). Place meanings surrounding an urban natural area: A qualitative inquiry. *Journal of Environmental Psychology*, 31(4) 344-352. doi:10.1016/j.jenvp.2011.04.002
- Stein, T.V. & Anderson, D.H. (2002). Combining benefits based management with ecosystem management for landscape planning: Leech Lake watershed Minnesota. *Landscape and Urban Planning*, 60(3), 151-161. doi:10.1016/S0169-2046(02)00053-1
- Stein, T.V., Denny, C.B., & Pennisi, L.A. (2003). Using visitors' motivations to provide learning opportunities at water-based recreation areas. *Journal of Sustainable Tourism*, 11(5), 404-425. doi:10.1080/09669580308667213
- Stoop, I.A. (2004). Surveying Nonrespondents. *Field Methods*, 16(1), 23-54. doi:10.1177/1525822X03259479
- Streiner, D.L. (2005). Finding our way: An introduction to path analysis. *Canadian Journal of Psychiatry*, 50(2), 115-122.
- Swearer, D.K. (1998). Buddhism and ecology: Challenge and promise. *Earth Ethics* 10(1) Center for Respect of Life and Environment. <http://fore.yale.edu/religion/buddhism/>
- Sze, J. (2004). Gender, asthma politics, and urban environmental justice activism. In. R. Stein (Ed.), *New Perspectives on Environmental Justice* (pp. 177-206). New Brunswick, NJ: Rutgers University Press.
- Tarrant, M.A., & Cordell, H.K. (2002). Amenity values of public and private forests: Examining the value–attitude relationship. *Environmental Management*, 30(5), 692–703. doi:10.1007/s00267-002-2722-7
- Tashakkori, A., & Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage.
- Taylor, A. F., Kuo, F.E. & Sullivan, W.C. (2002). View of nature and self-discipline: Evidence from inner city children. *Journal of Environmental Psychology*, 22, 49-63. doi:10.1006/jevp.2001.0241

- Taylor, D.E. (2002). *Race, class, gender, and American environmentalism*. Gen. Tech. Rep. PNW-GTR-534. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. <http://www.fs.fed.us/pnw/pubs/gtr534.pdf>
- Taylor, D.E. (2008). Diversity and the environment: Myth-making and the status of minorities in the field. *Research in Social Problems and Public Policy*, 15, 89-148. doi:10.1016/S0196-1152(07)15003-1
- Taylor, D.E. (2011). The evolution of environmental justice activism, research, and scholarship. *Environmental Practice*, 13(4), 280-301. doi:10.1017/S1466046611000329
- Teddle, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research*, 1(1), 77-100. doi:10.1177/2345678906292430
- Toossi, M. (2002). A century of change: The U.S. labor force, 1950-2050. *Monthly Labor Review*, 125(5), 15-28. doi:10.2307/41845363
- Trigger, D., Mulcock, J. (2005). Forests as spiritually significant places: Nature, culture and 'belonging' in Australia. *The Australian Journal of Anthropology*, 16(3), 306-320. doi: 10.1111/j.1835-9310.2005.tb00313.x
- Tronstad, R., Teegerstrom, T., & Osgood, D.E. (2004). Role of technology for reaching underserved audiences. *American Journal of Agricultural Economics*, 86(3), 767-771. <http://www.jstor.org/stable/3697820>
- Tuan, Y.F. (1977). *Space and Place: The Perspective of Experience*. Minneapolis, MN: University of Minnesota Press.
- Tyrväinen, L., Ojala, A., Korpela, K., Lanki, T., Tsunetsugu, Y., & Kagawa, T. (2014). The influence of urban green environments on stress relief measures: A field experiment. *Journal of Environmental Psychology*, 38, 1-9. doi:10.1016/j.jenvp.2013.12.005
- Ulrich, R. S., Simons, R., Losito, B.D., Fiorito, E., Miles, M.A., & Zelson, M. (1991a). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11(3), 201-230. doi:10.1016/S0272-4944(05)80184-7
- Ulrich, R.S., Dimbeg, U. & Driver, B.L. (1991b). Psychophysiological indicators of leisure benefits. In B. L. Driver, P. J. Brown, and G. L. Peterson (eds.). *Benefits of Leisure* (pp. 73-89). State College, PA: Venture Publishing.
- Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. pp. 73-137 In S.R. Kellert & E.O. Wilson. *The biophilia hypothesis*. Washington, D.C.: Island Press/Sherwater Books.

- United Nation Environmental Program (UNEP). (2007). *Global Environment Outlook: Environment for Development*, Biodiversity (Chapter 5) United Nation Environment Program, Nairobi, Kenya, 158-192.
- U.S. Census Bureau. (2013). *USA Quickfacts*. (Data file). Retrieved August 1, 2015, from: <http://quickfacts.census.gov>.
- U.S. Department of Agriculture Forest Service. (2011). National Report on Sustainable Forests—2010. FS-979. <http://www.fs.fed.us/research/sustain/national-report.php>
- U.S. Department of Agriculture Forest Service. (2005). FIA fact sheet series: Forest inventory and analysis sampling and plot design. Accessed online, June 24, 2011: <http://www.fia.fs.fed.us/library/factsheets/datacollections/Sampling%20and%20Plot%20design.pdf>
- Van Liere, K., & Dunlap, R. (1980). The social bases of environmental concern: A review of hypotheses, explanations, and empirical evidence. *Public Opinion Quarterly*, 44(18), 1 - 197. <http://www.jstor.org/stable/2748427>
- Van Weiren, G. & Kellert, S. (2013). The origins of aesthetic and spiritual values in children's experience of nature. *Journal for the Study of Religion, Nature & Culture*, 7(3), 243-264. doi:10.1558/jsrnc.v7i3.243
- Vaske, J.J., Donnelly, M.P., Williams, D.R., & Jonker, S. (2001). Demographic influences on environmental value orientations and normative beliefs about national forest management. *Society and Natural Resources*, 14(9), 761-776. doi:10.1080/089419201753210585
- Vaske, J.J. & Donnelly, M.P. (1999). A value-attitude-behavior model predicting wildland preservation voting intentions. *Society and Natural Resources*. 12(6), 523-537. doi:10.1080/089419299279425
- Verchick, R. (2004). Feminist theory and environmental justice. In. R. Stein (Ed.), *New Perspectives on Environmental Justice* (pp. 63-77). New Brunswick, NJ: Rutgers University Press.
- Vining, J. & Tyler, E. (1999) Values, emotions, and desired outcomes reflected in public responses to forest management plans. *Human Ecology Review*, 6(1), 21-34. <http://www.humanecologyreview.org/pastissues/her61/61viningtyler.pdf>
- Votrin, V. (2005). The orthodoxy and sustainable development: A potential for broader involvement of the orthodox churches in Ethiopia and Russia. *Environment, Development and Sustainability*, 7(1), 9–21. doi:10.1007/s10668-003-5053-9

- Waddington, D.G., & Velkoff, V.A. (2010). Projecting race and Hispanic origin for the U.S. Population and an examination of the impact of net international migration. Working paper for United Nations Statistical Commission & Economic Commission for Europe Conference of European Statisticians. Retrieved online July 28, 2012: <http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.11/2010/wp.34.e.pdf>
- Warner, K. (2002). Linking local sustainability initiatives with environmental justice. *Local Environment*, 7 (1), 35-47. doi:10.1080/13549830220115402
- Wellman, J.D. & Propst, D.B. (2004). *Wildland Recreation Policy*, 2nd Edition. Malabar, FL: Krieger Publishing Co.
- White, D.D. & Hendee, J.C. (2000). *Primal hypothesis: the relationship between naturalness, solitude, and the wilderness experience benefits of development of self, development of community, and spiritual development* (Proceedings No. RMRS-P-15-VOL-3): USDA Forest Service. http://www.fs.fed.us/rm/pubs/rmrs_p015_3/rmrs_p015_3_223_230.pdf
- Whitney, G.G. & Upmeyer, M.M. (2004). Sweet trees, sour circumstances: The long search for sustainability in the North American maple products industry. *Forest Ecology and Management*, 200(1-3), 131-333. doi:10.1016/j.foreco.2004.07.006
- Williams, D.R. & Vaske, J.J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science*, 49(6), 830-840. http://www.fs.fed.us/rm/pubs_other/rmrs_2003_williams_d001.pdf
- Wilson, E.O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.
- Winter, C. & Lockwood, M. (2004). The natural area value scale: A new instrument for measuring natural area values. *Australian Journal of Environmental Management*, 11(1), 11-20. doi:10.1080/14486563.2004.10648594
- World Commission on Environment and Development (WCED). (1987). *Our Common Future*. Oxford: Oxford University Press.
- Yancey, A.K., Ortega, A.N., & Kumanyika, S.K. (2006). Effective recruitment and retention of minority research participants. *Annual Review of Public Health*, 27, 1-28. http://toniyancey.com/publications_files/aypub2006d.pdf
- Young, R.A. & Crandall, R. (1984). Wilderness and self-actualization. *Journal of Leisure Research*, 16(2), 149-160.