Policy Sciences **37**: 37–69, 2004.

Using multiple methods to understand agency values and objectives: Lessons for public lands management

INGRID M. MARTIN[1] & TODDI A. STEELMAN[2]

[1]*Department of Marketing, College of Business Administration, California State University, Long Beach, CA 90840, U.S.A., E-mail: imartin@csulb.edu*
[2]*Department of Forestry, North Carolina State University, P.O. Box 8008, Raleigh, NC 27695-8008, U.S.A., E-mail: toddi_steelman@ncsu.edu*

Abstract. The Government Performance and Results Act of 1993 (GPRA) directs agencies to determine their objectives based on what stakeholders value. Identifying, measuring and analyzing values and objectives is a key challenge for public land management agencies. Using R and Q factor analysis we assess the values and objectives within the Leadership Team (LT) of the United States Forest Service (USFS). R-factor analysis demonstrates strong support among the LT for a more preservation-oriented view to manage public lands. Q-factor analysis reveals divergent perspectives among the LT and how the aggregated preservation orientation found with the R-factor analysis plays out according to individual perspectives. The findings illustrate the challenges inherent in identifying what values and objectives exist, how they should be analyzed, and the implications for choosing one set of values and objectives over another in public lands management to fulfill the mandates under GPRA.

Introduction

The Government Performance and Results Act of 1993 (GPRA) seeks to improve the efficiency and effectiveness of federal programs by creating a system that establishes clear objectives for performance and measurements of program outcomes and results. GPRA requires federal agencies to focus on specified program outcomes, quality service, and customer satisfaction by requiring strategic planning and performance measures based on identified objectives (cf. Radin, 1998). GRPA brings to the forefront the importance of determining what an agency values within a framework of explicitly understanding values and objectives.

Dealing with directives, such as GPRA, creates challenges for public land management agencies that must distill measurable and tractable values and objectives from among many competing options. The recent history of public lands management has been filled with controversy, conflict and divisiveness due in part to differences between and among opposing sets of values and objectives for important national resources such as timber, watershed protection, wildlife and much more. Since the 1960s, the relative cohesiveness of commodity management values (e.g., timber, grazing, minerals) was challenged by growing public concern about non-commodity values (e.g., aesthetics, tourism, hiking), creating conditions ripe for clashes over how public lands should be managed (Hays, 1987). The proliferation of diverse values and objectives creates manage-

ment problems on public lands in general and particularly on lands managed within the USDA Forest Service (USFS), in part, because of the multiple use mandate (Shields et al., 2002).* The drive to homogenize values and objectives does a disservice to what may be clearly distinctive groups of values and objectives. Moreover, the impetus to find a single dominant value or objective fails to reflect the complexity embodied in the management of public lands.

Oftentimes values and objectives are not as monolithic within an organization or group as they appear. Failure to recognize the multiple sets of values at play creates false expectations for the types of management actions that can be promoted, selected or implemented successfully. For instance, contradictory understanding and unrealistic expectations about stakeholders' prevailing values, and the management actions that flow from them, place land management agencies at risk of lawsuits or other obstructive actions from stakeholder groups increasingly capable of impeding land management activity. A recent example is the lawsuits that have prevented salvage timber sales after catastrophic wildfires in California, Colorado and New Mexico. Importantly, diverse values and objectives for the management of public lands are present not only within the public at large, but among officials and staff working for the public land management agencies as well. Failure to understand the diversity of values and objectives within an agency also can hinder the ability to achieve agency goals.

Different methodologies for identifying, measuring and analyzing values and objectives influence which values and objectives ultimately are viewed as most important, and therefore most likely, to be served. Multiple methods of inquiry reveal different perspectives about values and objectives. Relying on one mode of analysis or methodological approach may leave the researcher and the public land manager with a fragmented view of the overall problem facing the decision makers. Not having a complete understanding of their internal management values and objectives can result in inaccurate trend descriptions, erroneous diagnoses of problems, and/or misspecification of land management options.

This research provides insight into alternative ways of measuring and analyzing values and objectives for researchers, policy practitioners and public land managers. To illustrate the challenges inherent in determining which values and objectives exist, we chose to analyze values and objectives for public land management as expressed by the USFS Leadership Team (LT) during the tenure of Chief Michael Dombeck (1997–2002). The role of the LT is to provide national guidance for policymaking within the USFS. The USFS is a hierarchical organization comprised of four levels – the Washington Office, Regional Offices, national forests, and ranger districts. Each national forest within the USFS is required to implement these policy guidelines from the Washington Office in their forest planning process. Historically, the individual forest has significant

*Shields et al. (2002) is the technical report that was used as the foundation to provide public input into the National Strategic Plan for the USFS. For details of how this research was conducted and used to develop the strategic plan, see the technical report.

flexibility in deciding how to implement the policies and guidelines of the LT. In other words, the policy guidelines may be interpreted as 'this is what we should do' or 'this is a suggestion' based on the values and objectives of the managers in the field offices. The LT is comprised of all the regional supervisors, the research directors, the top managers, and the Chief of the USFS. We analyzed the values and objectives of the LT using R-factor analysis to uncover the dominant perspective(s). The same data were analyzed using Q-factor analysis revealing divergent perspectives regarding the focus of internal management values and objectives. The results from these analyses indicate that different patterns of values and objectives emerge depending on the methodology employed.

The next section discusses the divisions within the existing literature on USFS employee public land values and objectives and the methodological assumptions that underpin the collection and analysis of data for these studies. The following section details the conceptual differences that exist between two types of factor analyses as a way to understand better the public land values and objectives that guide the LT, a description of the methodology used to measure public land values and objectives, and the results from both types of factor analyses. Finally, we end with a discussion of the policy and managerial implications that emerge from the conflicting values and objectives that underlie the policymaking of the LT.

USFS employee public land values and methodological assumptions

The literature that addresses agency values and objectives for managing national forests can be divided into two separate, but conflicting, bodies of work. The first portrays a responsive agency engaged in a shift in values away from instrumental, conservation uses of resources toward the intrinsic, preservation value of public lands (Culhane, 1981; Clarke and McCool, 1985; Kennedy et al., 1998; Hays, 1987). Beginning in the 1980s, several observers of the USFS began to argue that agency employee values, perceptions and attitudes were changing (Kennedy, 1988; Tipple and Wellman, 1991; Brown and Harris, 1992b; Mohai and Jakes, 1996). For example, during the 1980s, USFS employee support for increased timber harvesting dropped from 62% to 7% (Hirt, 1994: p. 282). Mohai and Jakes (1996), in a survey of USFS line officers and staff, found that a significant majority believed that substantive changes had occurred since the mid 1980s and that this change had been in a positive direction from the commodity to non-commodity value orientation. Indicative of this change, in 1992 USFS Chief Dale Robertson announced the transition from traditional scientific management in the National Forests to ecosystem management.* Even more recently, the Committee of Scientists recognized the

*Ecosystem management is an ecological approach that blends the needs of people and environmental values. Under an ecosystem approach, the national forests and grasslands would represent diverse, healthy, productive, and sustainable ecosystems (Robertson, 1992).

'shift from a focus on sustained yield of commodity flows to a broadened concept of sustainability defined by ecological, economic, and social conditions' (Carey, 1999: p. 42; Johnson et al., 1999).

Another body of literature reveals an agency and employees resistant to change and constrained by institutional rigidities. This literature depicts an organization entrenched in a strong value orientation reminiscent of the scientific management origins from which the USFS evolved. Traditional scientific forestry was founded on the instrumental use of natural resources for the economic betterment of human society, as articulated through a utilitarian philosophy (Hays, 1959). Conservationism, as it was known, embodied the multiple-use, sustained yield* values that gave rise to the USFS more than a century ago (Hays, 1959). Researchers found that providing commodities under a multiple use philosophy remains an important value orientation for segments of the USFS (Twight, 1983; Twight and Lynden, 1989; Kennedy, 1988; Mohai and Jakes, 1996). For instance, Hirt (1994) cited a 1988–89 survey of USFS employees that documented the five most rewarded values in the agency. They were loyalty to the agency, meeting commodity targets, promoting the agency's image, following 'the rules', and teamwork (Hirt, 1994: p. 282). While some researchers found evidence of change in terms of the total amount of timber offered, sold, and harvested on national forests (Farnham and Mohai, 1995) or increasing recreation, wildlife and fish habitat management over historical USFS levels (Farnham et al., 1995), others have found little evidence supporting shifts to fewer commodity or amenity outputs in national forest plans (Sabatier et al., 1996).

There is little in the literature that attempts to explain and reconcile these divergent perspectives about USFS management values and objectives. Rather, each literature emphasizes its own perspective to the exclusion of the other. Two exceptions to this drive to aggregate values and objectives are Gregg's (1992) research into differing perspectives along a land ethic spectrum within the agency and Brown and Harris' (1998) follow up work in a national survey of line and staff officers within the USFS. Both Gregg (1992) and Brown and Harris (1998) document the existence of multiple co-existing perspectives by USFS management about differing land ethics. Outside of Gregg (1992) and Brown and Harris' (1998) work there appears to be a strong desire to aggregate findings to present monolithic values and objectives within the agency.

Surveys, interviews, content analyses, and quantitative indicators have been used to gain a better understanding about the values and objectives of managers within the agency. Collection and analysis methods inherently reflect assumptions about the data. If a researcher uses a methodological approach or technique that supports aggregation and generalization, then a more contextual analysis of the variation within the data set is prohibited. For instance, Fan

*Multiple use, sustained yield implies the achievement and maintenance of a high-level regular output of all renewable resources of the national forests for human consumption without impairment of the land's productivity.

and Bengston (1997) used content analysis to evaluate 30,000 on-line news media stories about the USFS. They found a growing acceptance of ecosystem management, downward trends in expressions about commodity values and beliefs and unexpectedly high frequencies in moral/spiritual/aesthetic values. Farnham et al. (1995) used quantitative indicators to illustrate that greater priority was given to wildlife and recreation values within the agency. Phone and mail surveys using descriptive statistics have been employed by a variety of other researchers (Mohai and Jakes, 1996; Brown and Harris, 1992a).

While the generalized data in these studies helps further understanding about the broad trends in public lands management, it tells us little about the prevalence or intensity of divergent perspectives. Moreover, such generalized data can obscure points of conflict and may lead to false beliefs or expectations about agreement on goals or objectives. Likewise, aggregated data can obscure possibilities for consensus among otherwise divergent viewpoints, constraining opportunities for agreement. These realizations provided the motivation to undertake an analysis of LT public land values and objectives using two different types of factor analyses to demonstrate how methodological assumptions influence the findings and their implications for public lands management.

A comparison of two types of factor analyses

R- and Q-factor analyses are two methodologies used to understand data on values and objectives. While R-factor analysis has been used across numerous disciplines for some time, Q-factor analysis increasingly is used in analyzing environmental and natural resource issues (Adams and Proops, 2000; Barry and Proops, 1999; Steelman and Maguire, 1999). The objective of using factor analysis is to uncover and confirm the structure in the various relationships among variables. Factor analysis accomplishes this by summarizing the interrelationships among variables to aid in the conceptualization of the data and revealing empirical relationships that otherwise might not be apparent (Gorsuch, 1983). R- and Q-factor analyses involve reducing the original variables into smaller groups of variables or sets of dimensions. Each smaller group of variables represents a single underlying factor or construct that is responsible for the observed correlations (Iacobucci, 2001). Each factor represents an area of generalization that is qualitatively distinct from that represented by another factor. According to Gorsuch (1983) factors become recognized as underlying constructs only upon replication.

While factor analysis is key to both the R- and Q-approaches, R- and Q-factor analysis are 'not merely variations in statistical designs, but [are] two fundamentally distinct methodologies' (Addams, 2000: p. 36). Q-factor analysis is more subjective than R-factor analysis and attempts to '…study subjectivity in an organized manner…' (Barry and Proops, 1999: p. 339). In Q-factor analysis, the goal is to discover different subsets of individuals within the entire group that hold similar and dissimilar views. It is a more contextual mode of

analysis that can provide researchers, policy makers and practitioners with information about how public land values and objectives are perceived by various subgroups, facilitating the identification of similar perspectives or views within each subgroup. In contrast, R-factor analysis is a more generalizable means of analysis that uncovers the most prevalent variables among a group of respondents. The end result from a Q-analysis is to reveal 'an in-depth portrait of the typologies of perspectives that prevail in a given situation' (Steelman and Maguire, 1999: p. 363) while the end result of the R-factor analysis is to reveal the dominant underlying dimensions that prevail among a group of individuals (Iaccobucci, 2001). Together these two analytical methods complement each other.

The techniques also differ in their methodological foundation for correlation and clustering. According to Addams (2000: p. 36), '[t]he major use of factor analysis in social science research has been in terms of R-methodology studies involving the factorization of intercorrelations arising from the measurement of individuals on tests. Q-factor analysis differs from R-factor analysis by computing correlations between persons, rather than tests, traits or variables that are disjoined from the individuals to whom they belong. R-factor analysis identifies similarities across variables, traits or tests such as age, scores, responses, income, race, etc., whereas Q-factor analysis identifies patterns of how groups of individuals perceive an issue or topic. In addition, R-factor analysis works by clustering together the variables included in the study. In contrast, Q clusters together people's differing perspectives on a topic.

R- and Q-methods of factor analyses were used to illustrate if and how the values and objectives differed among members of the LT. The data set was based on a survey that measured the public land values and objectives held by the LT. R-analysis was expected to reveal similarities across variables, thus, uncovering the dominant set of values and objectives for the LT. In contrast, Q-analysis was expected to reveal varying patterns in people's perspectives. The guiding premise was that the two methodologies would expose differences in the data that were obscured by each method used in isolation, resulting in a more comprehensive and thorough understanding of the values and objectives held by the LT.

Methodology

A public land values and objectives survey was used in this study, as developed and tested by Martin et al. (1998) and Shields et al. (2002). The construct of 'values' has been defined in numerous ways by different authors across various paradigms (e.g., Rokeach, 1973; Brown, 1984; Bengston, 1994; Schwartz, 1992). From the Rokeachian perspective, values are abstract ideals that shape an individual's '…conception of the desirable' (Rokeach, 1973: p. 10). In the context of public lands, public land values are defined as the underlying motivations that influence how individuals and groups relate to public lands. When

individuals or groups make decisions on how to use, manage, or conserve public lands, they are guided by their basic underlying public land values to identify these objectives (cf. Keeney, 1992).

We identified the set of public land objectives that guide public land managers in their decision making process. A clear understanding of their organizational values and resulting objectives can help managers if they want to avoid undesirable consequences and achieve desirable ones. The survey to collect public land values and objectives was administered via telephone interviews with the LT. Out of 69 members of the Leadership Team, 66 completed the telephone survey (96%).*

The survey consisted of 20 statements focusing on *Objectives* for managing public lands, 25 statements measuring *Public Land Values* (PLV), and a set of socio-demographic questions (see Appendix A for examples of the scale statements). The objective statements are based on a national study of what the public wants to see achieved through the USFS strategic planning process (Shields et al., 2002). The statements were developed based on more than 80 focus groups conducted throughout the United States during 1998–99. The focus groups included both the public and USFS managers. All scale items were measured using Likert scales with the *Objectives* scale items anchored by 1 = not at all important and 5 = very important and the *Public Land Values* scale items anchored by 1 = strongly disagree and 5 = strongly agree.

R-factor analysis

Values for managing public land. The LT was asked to rate their values for public lands using the PLV scale (e.g., Martin et al., 1998, 2002). The PLV scale is a two-factor scale that measures the underlying motivations that influence individuals' values related to public lands. Based on earlier research (e.g., Martin et al., 1998), the scale had two dimensions: socially responsible individual values (SRIV) and socially responsible management values (SRMV). The SRIV factor is defined as 'values which are related to environmental and resource problems, motivated by a desire to satisfy personal needs and a concern for the welfare of society in general' (Antil, 1984: p. 20). The SRMV

*The average age was 50 years old (age range: 33 to 65), with 37 members of the LT working in the Washington, D.C. area (WO) and the remaining 29 in various parts of the country (field). Forty-six members of the LT are male and 20 are female, with 52 white, 10 African-American, 1 Native-American and 1 Asian American (2 respondents refused to answer). Ninety-six percent (63) of the respondents were born in the United States. Their educational level had some variation with 20 (30%) having a bachelor' degree, 21 (32%) a master's degree, 3 (5%) a professional degree (e.g., MD, DDS, DVM, JD), and 22 (33%) a doctoral degree. The average number of hours worked per week was 55 hours with a range of 40 to 84 hours. Members of the LT spent on average 17.5 hours per week engaged in leisure activities with a range of 4 to 40 hours. The average personal income for the LT is $148,567 (ranging from $65,000 to $250,000) and the average household size is 2.8 with 55 (83%) living in households ranging from 2 to 4 people.

factor is defined as 'values that guide the actions and policies of management agencies on public lands' (Martin et al., 2002).

The LT responded to the 25-item scale and the data were subjected to maximum likelihood factor analysis using varimax rotation. The results confirmed two factors with 17 items loading on the SRIV factor and eight items loading on the SRMV factor. The factor loadings and item-total correlations are listed in Appendix A and the means and standard deviations for the individual items are presented in Appendix B. The reliability coefficient for the 25-item PLV scale is $\acute{\alpha} = .83$, confirming that the factors have strong internal consistency and are optimally consistent with Martin et al. (1998; Nunnally, 1978).

The SRIV factor indicates that this group attaches strong importance to a preservation set of values. For example, as detailed in Table 1, the overall mean of the SRIV is 4.18 and the individual items range from 3.02 to 4.93. These individual scale item means and the overall scale mean are indicative of the strong preservation values that managers use to guide their individual decision making, with 1 indicating *strong disagreement* with preservation values and 5 indicating *strong agreement* with preservation values.

The results of the SRMV factor provide further support for the group's individual values on public land management. The overall factor mean was 4.10 and the individual scale item means ranged from 3.68 to 4.43. The group as a whole supported management practices that focus on preservation uses of public lands (see Table 1).

Objectives for managing public land. A confirmatory factor analysis was conducted on the 20 objective statements for the 66 respondents. Given that the correlations were relatively high among the objective measures we used a Promax rotation. The result was a four-factor model with interfactor correlations ranging between .36 and .49, thus supporting the oblique (Promax) rotation (Iacobucci, 2001). The reliability coefficient for the 20-item scale was

Table 1. Leadership team values and objectives for public lands (R analysis).

	LT mean (sd)	WO[a] mean (sd)	Field[a] mean (sd)
Values for public lands			
Socially Responsible Individual Values (SRIV)	4.18 (.45)	4.18 (.46)	4.19 (.44)
Socially Responsible Management Values (SRMV)	4.10 (.69)	4.14 (.67)	4.10 (72)
Objectives for public lands			
Access	2.81 (.76)	2.88 (.73)	2.73 (.76)
Preservation	4.01 (.39)	4.01 (.45)	4.01 (.44)
Local Use and Public Involvement	4.27 (.43)	4.21 (.55)	4.31 (.51)
Active Stewardship	4.39 (.55)	4.39 (.61)	4.40 (.58)

[a] WO includes the members of the LT that are located in or near to Washington, DC. Field includes those members of the LT that are located outside of the Washington, DC area.

α =.66. This test of internal consistency provided support for the four-factor model. These four factors reflected the dimensions of *Access* on public lands, *Local Use and Public Involvement* related to public lands, *Preservation* of public lands, and *Active Stewardship* related to public lands.

The first, *Access*, focuses on the objectives that the LT associates with providing the right to use and the right of entry for recreational and commercial interests. The second, *Local Use and Public Involvement,* identifies the LT's objectives based on attitudes toward local use, informing the public and determining at what level decisions and policies should be made. The third factor, *Preservation,* measures the LT's objectives as they relate to protecting and preserving natural resources. The fourth factor, *Active Stewardship*, includes objectives that pertain to volunteer activity and individual actions to support environmental issues at large. These four factors identify the dominant set of objectives that guide public land management practices. Similar to the public land values factors, they are consistent with the factors that were confirmed, through maximum likelihood factor analysis, in a national study of the U.S. population (Shields et al., 2002).

The results of the R-factor analysis provide a consistent picture of the importance that the LT places on various objectives related to public land management.* The *Access* dimension is viewed as neutral (M = 2.81), while the *Preservation, Local Use and Public Involvement*, and *Active Stewardship* dimensions are viewed as very important (M = 4.01 and M = 4.27 and M = 4.39, respectively; see Table 1).

To get a better understanding of the values and objectives of the LT group, the sample was divided into those respondents who work in the Washington, D.C. offices (WO)‡ and those who work in field offices (Field).§ We were able to

*Appendix C includes the factor scores and item-to-total correlations for the individual objective statements. Appendix D includes the related factor means and standard deviations that explain how the LT rated the importance of each of the objective statements in the decision making process.

‡ The WO group was composed of 37 respondents with an average age of 49 years (age range: 33 to 65) with 24 men and 13 women. The 37 members of this group include 30 white and 5 African-American (2 that refused to answer). Ninety-five percent (35) of the respondents were born in the United States. There was some variation in their educational level with 11 (30%) holding some type of bachelor's degree, 14 (38%) had a master's degree, 2 (5%) held a professional degree (e.g., MD, DDS, DVM, JD), and 10 (27%) held doctorate degrees. This subgroup worked an average of 54 hours per week with an average of 17 hours of leisure time per week. The average personal income for this group was $143,139 (ranging from $65,000 to $250,000) and the average household size was 2.7 people.

§ The Field group was composed of 29 respondents with an average age of 52 years (age range: 37 to 61) with 22 men and 7 women. This group is composed of 22 whites, 4 African-American, 1 Native-American, and 1 Asian (1 refused to answer). Ninety-seven percent (28) of the sub-sample was born in the United States. There was some variation in their educational level with 9 (31%) holding some type of bachelor's degree, 7 (24%) had a master's degree, 1 (3%) held a professional degree (e.g., MD, DDS, DVM, JD), and 12 (41%) held doctorate degrees. This sub-sample worked an average of 56 hours per week with an average of 18 hours of leisure time per week. The average personal income for this group was $155,307 (ranging from $95,000 to $221,000) and the average household size was 2.8 people.

determine whether the data would reveal important differences between land managers based on their position in the USFS. We calculated the means and standard deviations for each sub-sample and conducted comparisons using difference of means tests among the individual measures and the composite factors. We used the underlying factors from the entire group given the issue of stable factors with small sample sizes (Gorsuch, 1983). The resulting comparison of the WO and the Field managers found no significant differences between any of the measures (see Appendix B and Table 1 for means and standard deviations).

The results of the R-factor analyses demonstrate that the Forest Service LT strongly holds a more preservation-oriented view to manage public lands, both from their personal, individual perspectives and their management perspectives. The conclusion is that the group as a whole is internally consistent both in its public land values and its public land objectives. The findings are consistent with research that supports the view that agency employees have shifted to a more preservation, noncommodity oriented set of values and objectives for public lands (Wood, 2000; Kennedy, 1988; Tipple and Wellman, 1991; Brown and Harris, 1992b; Mohai and Jakes, 1996). Based on the results of the R-factor analysis, the conclusion that the LT shares one united voice with a common set of public land values and objectives seems reasonable, but evidence counter to this perspective emerges with examination of other literature that supports a more commodity-oriented, conservationist, multiple use values and objectives for USFS lands (Twight, 1983; Twight and Lynden, 1989; Kennedy, 1988; Mohai and Jakes, 1996). This led us to consider analyzing the data that we collected on public land values and objectives using an additional technique to triangulate our analyses and ensure that the results were robust (Jenkins, 1979). This is accomplished by reanalyzing the same data set using Q-factor analysis.

Q-factor analysis

Q-methodology follows a process in which a sample of statements is evaluated by a sample of respondents. The sample of statements (statement sample) in this case is the 45 survey statements measuring public land values (25 statements) and objectives (20 statements). The sample of respondents (person sample) was the Leadership Team, for a total of 66 respondents; however, four of the responses were incomplete resulting in an effective response rate of 62 responses (or 90% out of the original 69 members of the LT). In most cases, respondents were asked to compare all statements at the same time and arrange the statements in a normal distribution that forces them to choose which statements they agree with the most and which they agree with the least. In this manner, respondents must compare each statement against all others. However, in this case, the Likert scale in the survey response facilitated the sorting requirement (cf. Kalof, 2000; Brunner, 1983). The five-point Likert scale was

modified to a −2 to +2 numeric scale and the responses of the person sample were coded accordingly.

The 62 responses to the 45 statements were correlated in a 62-by-62 matrix. The matrix was factor analyzed using the QMethod software (Schmolck and Atkinson, 2001). The initial factor loadings were determined by QMethod, which extracted seven centroid factors. Factors with eigenvalues greater than 1.00 and with an explanatory value greater than 3% were considered significant. Varimax rotation was used to rotate the factors. The analysis revealed three factors – Biocentrism with a Preservation Focus, Commodity Management with a Local Focus, and Multiple Use with Active Stewardship, as indicated in Table 2.

Factor 1: Biocentrism with Preservation Focus. The statements in Factor 1 typified a focus on biocentric values with an emphasis on the preservation of public lands, see Appendix E for Z-score values for each statement. The Factor 1 grouping agreed strongly with statements 4, 5, 6 and 28, which emphasize protecting water resources, ecosystems, wilderness and wildlife habitat on National Forests and Grasslands and the importance of future generations in public lands decisions. Factor 1 was distinguished from the other factors in its support for statement 35, which recognized forests' right to exist for their own sake and a moderately positive orientation to wildlife, plants and humans having equal rights to live and grow. This factor also contained strong agreement with statements 35 and 36, which focused on the existence values* of National Forests and public lands. Factor 1 included statements 1 and 3 indicating some disagreement with expanded access for motorized off-road vehicles (ORVs) and developing new paved roads on public lands. A bias against local community decision-making and use of natural resources from the National Forests and grasslands for local communities also was evident in rankings of statements 8 and 19. Factor 1 supported individual actions for volunteer work for trails and campgrounds (14). Overall, Factor 1 has a biocentric perspective, a preference for preservation, and a bias against expanded access and local involvement.

Factor 2: Commodity Management with Local Focus. The statements in Factor 2 typified a commodity management focus with a trend toward local management. Factor 2 indicated strong agreement with the importance of informing the public about environmental impacts on public lands and economic values from public lands as well as encouraging collaboration between groups (statements 15, 16 and 17). Factor 2 also favored local decision-making and providing natural resources from forests and grasslands to local communities dependent on natural resources (statements 8 and 19). In addition to a focus at the local

*Existence values are the importance given to just knowing that something exists without actually having to experience it. For example, the value that people place on knowing that the Grand Canyon exists can be high even if they may never go there to enjoy its benefits.

Table 2. Leadership team perspectives (R and Q factor analyses).

R-factors	Factor 1: Biocentrism with Preservation Focus	Factor 2: Commodity Management with Local Focus	Factor 3: Multiple Use with Active Stewardship
Local Use and Public Involvement	Supportive of informing public about environmental impacts, and collaboration. Opposes local involvement in decision-making. Opposes serving local communities.	Strongly supports informing the public about environmental impacts, economic values and collaboration. Supports local decision-making, resource use for local communities.	Supports informing public about economic values and collaboration. Opposes local decision-making.
Preservation	Support protecting forests, ecosystems, wildlife habitat, wilderness. Supports forests existing for their own sake. Weak support for wildlife, plants and humans having equal rights. Strongly supports future generations as important as current. Opposes actively harvesting more trees.	Supports multiple uses of public lands, such as mining, grazing and timbering. Strongly opposes restricting mineral development, timber harvesting or grazing. Supports protection of watershed. Neutral on protecting habitat, ecosystems or wilderness.	Strongly supports multiple uses of public lands, such as mining, grazing and timbering. Strongly supports protecting forests, ecosystems and wilderness. Opposes actively harvesting more trees.
Access	Strongly opposes expanding access for ORV recreation. and new paved roads. Opposes designating recreation trails for specific use.	Opposes expanding access for ORV recreation and new paved roads. Opposes designating recreation trails for specific use.	Opposed to expanding access for ORV recreation. Neutral on new paved roads. Supports designating recreation trails for specific use.
Active Stewardship	Supports volunteer work for trails and campgrounds.	Strongly supports continued cultural uses of public lands.	Supports volunteer work for forests, grassland, trails, campground maintenance. Supports entry fees on public lands and for recreation. Supports and continued cultural uses.

level, Factor 2 favored multiple uses on public lands. Statement 18 emphasized the diverse uses for the National Forests and Grasslands such as grazing, recreation and wildlife habitat, while strongly opposing restricting existing multiple uses on public lands such as mineral development, timber harvesting and grazing (statements 9 and 10). Consistent with multiple use, Factor 2 supported continued cultural uses of public lands (statement 7). Factor 2 was opposed to developing new paved roads (statement 3) or expanding ORV recreation access (statement 12). The factor also looked negatively on the notion that forests, wildlife, plants and humans have equal rights to exist (statements 35 and 36). This factor also opposes paying entry fees for recreation (statement 29). Overall, Factor 2 favors multiple uses with preferences for local use and public involvement while indicating a bias against expanded access.

Factor 3: Multiple Use with Active Stewardship. Factor 3, much like Factor 1, expressed strong agreement with protecting water resources (statement 4) and protecting ecosystems and wildlife habitats (statement 5). However, Factor 3 strongly opposed the notion that forests should exist for their own sake or have equal rights with humans (statements 35 and 36). The perspective in this factor favored using forests for diverse uses, including recreation, grazing and wildlife habitat (statement 18). It was neutral on putting restrictions on timber harvests and grazing (statements 9 and 10). A bias against local control also was evident with this factor including opposition to the belief that the most important function for forests was to provide local jobs and economic opportunities for local communities (statement 39). Factor 3 did not support decision-making at the local level (statement 19), but it did favor collaboration (statement 17). Factor 3 opposed expanding access for ORVs, but supported designating existing recreational trails for specific uses. Factor 3 also provided support for volunteer actions to improve forests and grasslands (statement 14) and paying entry fees for public lands and recreation (statements 20 and 29). Factor 3 is a combination of multiple use values that opposes local uses and public involvement with an emphasis on individual stewardship action to support public lands.

The Q-analysis reveals that three distinctive viewpoints prevail within the Leadership Team. In contrast, the R-factor analysis did not identify significant differences within the LT and between sub-groups of the LT. Table 2 details how the four factors from the R-analysis differ among the three groups identified in the Q-analysis. The Q-analysis indicated that these three perspectives differed in their opposition to or support for aspects of management such as Local Use and Public Involvement, Preservation, and Access. The results of the R-analysis indicated that the strategic objectives of Preservation, Local Use and Public Involvement, and Active Stewardship dimensions were more important than the Access strategic objective factor. The R-analysis detects trends in the aggregated data set, and the Q-analysis reveals how these important, but more generalized, variables play out within individual perspectives.

The Washington Office Q-analysis

As with the R-analysis, the combined group was divided into the WO and Field groups, and each of these was subjected to its own Q-analysis to assess whether different types of perspectives prevailed between the two groups and within each sub-group. Recall that in the R-analysis there was a consistent identification of variables related to public land values and objectives between these two sub-groups. The same statistical procedures and decision rules in the Q-analysis of the combined group were followed with the WO and Field sub-groups. The analysis revealed three factors within the WO sub-group – Biocentric Preservation, Commodity Management with Local Focus and Multiple Use, as indicated in Table 3.

Factor 1: Biocentric Preservation. Factor 1 from the WO was closely aligned with Factor 1 from the LT overall. This factor agreed with the statements supporting ecosystems – forests (5), water (4) and wilderness protection (6) – and strongly supported the importance of the strategic objective of the existence value of public lands (35 and 36) (see Appendix F for Z-score values for each statement). Factor 1 was neutral on statements about informing the public about economic values from public lands and collaboration (16 and 17). This factor opposed statements providing resources to support local communities and local decision-making (8 and 19). Expanding recreational opportunities and access to public lands (1 and 3) were statements not favored by Factor 1. Preserving multiple use values on public lands and local use of natural resources were not rated as important public land objectives for this group (9, 10 and 18). Factor 1 supported statements volunteering to improve forests, grasslands, trails and campgrounds. In summary, Factor 1 favors preservation, is neutral on public involvement, is against local use and decision-making and is against expanded recreational access.

Factor 2: Commodity Management with a Local Focus. Factor 2 from the WO also closely resembled Factor 2 from the LT. This group strongly supported statements about diverse uses of the public lands including mining, grazing and timber harvesting (18), and strongly opposed statements restricting mineral development, timber harvesting and grazing (9 and 10). They also strongly opposed the rights of forests to exist for their own sake and the belief that wildlife, plants and humans had equal rights (35 and 36). Collaboration and informing the public about environmental impacts and the economic values of public lands were supported by this factor (15, 16, and 17). Statements supporting local communities, local decision making and preserving cultural uses also were supported by this factor (8, 19 and 7). The sorting of statements on access issues most distinguished this factor from the LT overall. The WO Factor 2 was neutral about expanding ORV access and designating existing trails for specific recreational uses (1 and 12). Factor 2 supported paying an entry fee to support public lands (20). Overall, this group favored commodity

Table 3. Washington Office Perspectives (R and Q Factor Analyses).

R-Factors	Factor 1: Biocentric Preservation	Factor 2: Commodity Management with Local Focus	Factor 3: Multiple Use
Local Use and Public Involvement	Supportive of informing public about environmental impacts. Opposes local involvement in decision-making. Opposes serving local communities.	Supports informing the public about environmental impacts, economic values and collaboration. Strongly supports local decision-making, resource use for local communities.	Supports multiple uses of public lands, such as mining, grazing and timbering. Strongly supports protecting forests, ecosystems and wilderness. Opposes actively harvesting more trees.
Preservation	Support protecting forests, ecosystems, wildlife habitat, wilderness. Supports forests existing for their own sake. Weak support for wildlife, plants and humans having equal rights. Strongly supports future generations as important as current. Opposes actively harvesting more trees.	Strongly supports multiple uses of public lands, such as mining, grazing and timbering. Strongly opposes restricting mineral development, timber harvesting or grazing. Supports protection of watershed. Neutral on protecting habitat, ecosystems or wilderness. Strongly opposes forests right to exist for its own sake.	Supports protecting ecosystems, wildlife habitats, preserving wilderness. Neutral on restricting mineral development, timbering and grazing. Opposes actively harvesting more trees.
Access	Strongly opposed to expansion of ORV access and new paved roads.	Neutral to expansion of ORV access and designating recreation trails for specific use. Opposes new paved roads.	Opposed to expansion of ORV access and new paved roads. Supports designating recreation trails for specific use.
Active Stewardship	Supports volunteer work for trails and campgrounds. Opposes entry fee for public lands.	Supports paying entry fee on public lands. Opposes fees for recreation. Supports continued cultural uses of public lands.	Supports volunteer work for forests and grasslands.

uses and local decision-making in support of traditional cultural uses of public lands.

Factor 3: Multiple Use. Factor 3 also reflected closely the same perspectives of the LT Factor 3. This group supported statements about multiple use values including ecosystems, forests, wilderness and diverse commodity-oriented uses (4, 5, 6, and 18). This factor was neutral on statements restricting mineral, timber and grazing (9, 10). They supported statements informing the public about the economic values from public lands (16) and supported collaboration (17). The factor opposed local decision making but supported traditional cultural uses (19, 7). On access issue they opposed expanded ORV access and the development of new roads (1, 3), but supported designating existing trails for specific uses (12). While they opposed entry fees (20), they were supportive of volunteering for improving forests and grasslands (13). Overall, this factor supports a vision of true multiple use. In sum, the results of the Q-analysis for the WO demonstrate that the three perspectives for the entire LT are clearly evident within this group.

Field Q analysis

The Field group divided into two distinct factors: Biocentric Preservation and Environmentally Sensitive Multiple Use. Table 4 outlines the differences that emerged between the Field Q-analysis and the R-analysis.

Factor 1: Biocentric Preservation. This factor paralleled the LT Factor 1 on virtually every statement with one exception. In this perspective, volunteering to improve forests and grasslands was viewed as neutral (see Appendix G for *Z*-scores). Overall, Factor 1 has a biocentric perspective, a preference for preservation, and a bias against expanded access and local involvement.

Factor 2: Environmentally Sensitive Multiple Use. Factor 2 was unlike any of the factors found in the LT or the WO. Factor 2 was distinguished in its multiple use orientation, but with a greater emphasis on environmental values. This perspective strongly supported the protection of watersheds, ecosystems and habitats (4 and 5) and supported protection of wilderness (6). Statement 28 rated future generations just as important as the current generation in decision-making about public lands. While this factor opposed restricting timber harvesting or grazing (10), it did not advocate for actively harvesting more trees (38). Factor 2 supported statements restricting mineral development (9) and strongly supported collaboration as well as informing the public about environmental impacts on public lands (17 and 15). Preserving the diverse uses of public lands was important in this Factor (18), as was preserving cultural uses (7). Factor 2 also supports local decision-making and local communities' use of resources from the public lands (8 and 19). Factor 2 opposed paying entry fees

Table 4. Field Office Perspectives (R and Q Factor Analyses).

R-Factors	Factor 1: Biocentric Preservation	Factor 2: Environmentally Sensitive Multiple Use
Local Use & Public Involvement	Supportive of informing public about environmental impacts, and collaboration. Opposes local involvement in decision-making. Opposes serving local communities.	Supportive of informing public about environmental impacts. Strongly supportive of collaboration. Supports local involvement in decision-making. Supports serving local communities and continued cultural uses.
Preservation	Support protecting forests, ecosystems, wildlife habitat, wilderness. Supports forests existing for their own sake. Weak support for wildlife, plants and humans having equal rights. Strongly supports future generations as important as current. Opposes actively harvesting more trees.	Support protecting forests, ecosystems, wildlife habitat, wilderness. Opposes forests existing for their own sake and wildlife, plants and humans having equal rights. Supports future generations as important as current. Supports restricting mineral development, but opposes restricting timber harvests and grazing.
Access	Opposed to expansion of ORV access and strongly opposed new paved roads.	Opposed to expansion of ORV access and strongly opposed new paved roads.
Active Stewardship	Neutral on paying entry fee on public lands and fees for recreation. Neutral on volunteering to help improve public lands.	Supports volunteering to help improve public lands. Opposes paying entry fee on public lands.

on public lands (20), but did support volunteering to help improve forests and grasslands (13). This factor also consistently opposed expanding ORV access and developing new paved roads (1 and 3).

The Q-factor analyses of the WO and Field sub-groups reveal differences between these two groups of managers. Three perspectives emerged from the WO, while the Field revealed two perspectives. Biocentrism with a Preservation Focus was present in both the WO and Field, but the Commodity Management with a Local Focus perspective was notably absent from the Field group. Unlike the R-analysis, the Q-analysis reveals different values and objectives between the groups. While Biocentrism with a Preservation Focus clearly is present within the LT as a whole and the WO and Field separately, different perspectives exist between the two levels of management. Demonstrating empirically the existence of different perspectives may explain some of the divergence in the existing literature on the topic of USFS management values.

Public policy and managerial implications

Controversy, conflict and divisiveness have plagued the debate over the use and management of public lands for decades. Better understanding the values and objectives for public lands may create opportunities for less conflict-ridden management. The critical finding in this research is that the dominant, single perspective articulated by the LT through their strategic planning and policy objectives is actually divided into different and potentially conflicting perspectives, including divergent perspectives between the Washington Office and the Field managers. The results from this research have implications for policy makers, practitioners and researchers alike. The manner in which values and objectives are measured and analyzed has implications for beliefs and assumptions about policy and management action on the ground, as well as the way research is conducted.

The R-analysis uncovered the dominant preservation-oriented perspective of the Leadership Team that guided policy decisions under Chief Dombeck, as evidenced by the Roadless Initiative (1999). Also, the R-analysis indicated that the policy perspectives between the Washington and Field managers of the Leadership Team did not differ. This perception of a consistent preservation-oriented perspective could lead us to believe that there is uniform support for these values and objectives. But if divergent perspectives rather than a single dominant perspective exist, what are the implications for the management of our public lands?

First, these findings pose a significant challenge for those who must do planning on a widespread basis within an agency. Comprehensive planning exercises, like the Government Performance and Planning Act, that emphasize the importance of understanding values and objectives, are difficult to fulfill when there is no clear agreement on values and objectives. GPRA requires all federal agencies to prepare five-year strategic plans, an annual performance

plan and annual performance reports based on these plans (Radin, 1998). Such legislation presumes that values and objectives are held uniformly and easily measured to facilitate clear feedback for improved program performance. As this research indicates, not only are values and objectives diverse, but different methodologies reveal different patterns in how these values and objectives are held.

The values and objectives revealed through this analysis also point to the challenges for creating the objective, quantifiable and measurable forms of goals mandated under GPRA. The intended goal of GPRA ultimately is to serve the public better through increased accountability. However, this goal will be left unfulfilled if the values and objectives of the many constituencies, including internal constituencies, are misidentified and measured incorrectly. GPRA is perhaps more user-friendly to agencies that are geared toward the production of easily identifiable goods and services and with clear management mandates, such as the National Park Service with its preservation mandate. Many of the objectives identified in the R- and Q-analyses focus on processes as opposed to outcomes, which are favored under GPRA. How does one measure Local Use and Public Involvement with its elements of collaboration, public outreach and local decision-making? How would one create an objective, quantifiable measure for Biocentric Preservation? The important social values and objectives expressed in this analysis are difficult to measure but nonetheless important to the ability of the USFS to serve its public well.

Second, this research begins to implicate methodological approaches in part for the dilemmas facing the management of public lands. Different methods affect which values and objectives are perceived to exist and how public lands values and objectives inform and influence management direction. If our methodologies fail to detect the complexity and dimensions of the values and objectives held for our public lands, then decision makers are less likely to accommodate such perspectives. Before divergent perspectives can be considered, such divergent perspectives must be shown to exist in the management of public lands.

Third, the presence of divergent perspectives poses challenges to agency officials in how they implement policy and management actions. If values and beliefs are held uniformly, then implementation of policy through the rank and file can proceed without disruption. However, if different values and objectives exist, then implementation challenges may follow. For instance, in 1998 Chief Dombeck laid out his 'Natural Resource Agenda for the 21st Century,' which was a guiding document for the agency during his tenure (Dombeck, 1998). It outlined four main policy and management objectives, including maintaining and restoring watershed health and restoration, promoting sustainable forest ecosystem management, better management of forest roads, and recreation improvements. While elements of these objectives clearly are supported in the R-analysis, the Q-analysis makes equally clear that support for these objectives, especially for sustainable forest ecosystem management, is not uniform throughout the Leadership Team.

The implications for the different public land values and objectives between

the two levels of operation are important since they raise questions about how policy will be implemented once a directive or mandate is issued from the Washington Office. While the presence of competing perspectives does not predetermine how management objectives will be carried out, it does provide insight into why the disparity between the prevalent value shift in the agency has not provided a more uniform movement toward intrinsic and preservation values on the ground (e.g., Clarke and McCool, 1985). Recognizing that different perspectives exist suggests the need to learn to deal constructively with these perspectives. The implication from this finding is that it is necessary to learn how to integrate and accommodate these differing perspectives in the management of the public lands. Ignoring the presence of these divergent perspectives can lead to misleading expectations about what is desired for present and future uses of public lands.

Fourth, the findings may begin to explain why change from a predominantly instrumental, conservation and utilitarian perspective to a more intrinsic, preservation values perspective under Chief Dombeck and the Clinton Administration remain a challenge. While a more fundamental shift in forest values has taken place as evidenced in the R-analysis, this shift is expressed unevenly throughout the USFS Leadership Team, as evidenced in the Q-analysis. A preservation-oriented perspective clearly is present in the R-analysis and in all three factors of the Q-analysis, but pockets of differing perspectives still persist. If the individuals who hold these more traditional views occupy especially influential positions within the USFS, then they can exercise greater influence over policy and management decisions that affect public lands. As long as key individuals in influential positions within the agency hold conflicting values and objectives, the USFS likely will experience resistance in moving toward a stated mission or goal. These minority perspectives may persist because the persons who have them believe that their views will prevail when a new administration replaces the one that conflicts with their view. Shifting political winds quickly can alter the intensity and desire to express one's values and perspectives.

Those who exercised formal power within the agency during the Clinton Administration favored intrinsic and preservation values. These values are clearly present in both the R and Q-analyses. The other perspectives that emerged, Commodity Management with Local Focus and Multiple Use, may be seen as variations on value expressions that lean toward utilitarian, instrumental, or conservationist values. These latent values and objective expressions are important to consider even if they were not favored under the Administration at that time. Not only will the individuals holding these perspectives influence national forest management, but also as the broader social context changes they may feel more or less emboldened to act on their perspectives. Depending on how external forces shape the direction of the agency, especially as new administrations enter office and different political agendas take hold, the more latent perspectives may emerge as dominant depending on the cues from the leadership.

Under the G.W. Bush Administration, the dominant perspective seems to be moving more toward those that were latent during the Dombeck and Clinton era. Commodity values and multiple use appear to be favored more so than preservationist values, as illustrated by the Administration's reversal of the Clinton Roadless Initiative. The Bush Administration's more instrumental and conservationist perspectives may provide conditions for more vocal expression by those within the LT that possess Commodity Use with a Local Focus and Multiple Use perspectives, which were less welcomed under the Dombeck and Clinton leadership. Future research should investigate the directions these trends take.

This research provides evidence of how multiple methods can help provide more in-depth understanding of the values and objectives held by public land managers. Appreciation for the diversity of perspectives about values and objectives reveals the weaknesses in policies like GPRA that oversimplify how to hold agencies accountable. Better understanding of the values and objectives of public land management can lead to a more accurate understanding of current conflicts and perhaps mediate future conflicts. Diverse perspectives about values and objectives also can begin to explain the implementation and institutional challenges that face an agency like the USFS as it attempts to alter its agency mission and focus. To find better solutions for the challenges facing our public lands we need to understand the multiple perspectives that frame problems and alternatives. Greater recognition of multiple perspectives is only the first step in addressing the conflicts and controversy that persist on our public lands. Much remains to be done in how we learn to integrate divergent perspectives to manage our public lands for the common good.

Acknowledgements

The authors thank Steve Brown, Wade E. Martin, Deborah Shields and two anonymous reviewers for their insightful comments and help with this article, and Frank Turina for valuable research assistance, but accept responsibility for any and all errors. This research was supported by funds provided by the Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture. Any conclusions do not necessarily reflect the position of the USDAFS.

References

Addams, H. (2000). 'Q Methodology,' in H. Addams and J. Proops, eds., *Social Discourse and Environmental Policy: An Application of Q Methodology*. Cheltenham, U.K.: Edward Elgar, pp. 14–40.

Addams, H. and J. Proops (2000). *Social Discourse and Environmental Policy: An Application of Q Methodology*. Cheltenham, U.K.: Edward Elgar.

Barry, J. and J. Proops (1999). 'Seeking sustainability discourses with Q methodology,' *Ecological Economics* 28: 337–45.

Bengston, D. N. (1994). 'Changing forest values and ecosystem management,' *Society and Natural Resources* 7: 515–533.

Brown, G. and C. C. Harris (1998). 'Professional foresters and the land ethic, revisited,' *Journal of Forestry* 96 (1): 4–12.

Brown, G. and C. C. Harris (1992a). 'The U.S. forest service: Toward the new resource management paradigm?' *Society and Natural Resources* 5: 231–245.

Brown, G. and C. C. Harris (1992b). 'The U.S. forest service: Changing of the guard,' *Natural Resources Journal* 32: 459–466.

Brown, S. R. (1971). 'The forced-free distinction in Q-technique,' *Journal of Educational Measurement* 8: 283–287.

Brown, S. R. (1985). 'Comments on the search for structure,' *Political Methodology* 11: 109–117.

Brown, T. (1984). 'The concept of value in resource allocation,' *Land Economics* 60: 231–246.

Carey, H. H. (1999). 'The guiding stare of ecological and rural sustainability,' *Journal of Forestry* 97 (5): 42–43.

Clarke, J. N. and D. McCool (1985). *Staking out the Terrain: Power Differentials among Natural Resource Management Agencies*. State University of New York Press: Albany, NY.

Cottle, C. E. and B. F. McKeown (1981). 'The forced free distinction in Q-technique: A note on unused categories in the Q-sort continuum,' *Operant Subjectivity* 3: 58–63.

Culhane, P. J. (1981). *Public Lands Politics: Interest Group Influence on the Forest Service and the Bureau of Land Management*. Baltimore: Johns Hopkins University Press.

Dombeck, M. (1999). 'USDA forest service to implement President's roadless initiative,' USDA United States Forest Service Press Release, October 13, 1999.

Dombeck, M. (1998). 'A gradual unfolding of a national purpose: A natural resource agenda for the 21st century,' Speech by Michael Dombeck, February 2, 1998. http://www.uwsp.edu/cnr/GEM/MD%20speeches/CD… /Natural%20Resources%20Agenda.html

Fan, D. and D. Bengston (1997). 'Public debates shaping forestry's future: An analysis,' Washington, D.C.: USDA Forest Service, Office of Communications.

Farnham, T. J., C. P. Taylor and W. Callaway (1995). 'A shift in values: Non-commodity resource management and the forest service,' *Policy Studies Journal* 23 (2): 281–295.

Farnham, T. J. and P. Mohai (1995). 'National forest timber management over the past decade: A change in emphasis for the forest service?' *Policy Studies Journal* 23 (2): 268–280.

Gorsuch, R. L. (1983). *Factor Analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Gregg, N. T. (1992). 'Sustainability and politics,' *Journal of Forestry* 90 (7): 17–21.

Hays, S. P. (1987). *Beauty, Health and Permanence: Environmental Politics in the United States, 1955–1985.* New York, NY: Cambridge University Press.

Hays, S. P. (1959). *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement 1890–1920*. Pittsburgh, PA: University of Pittsburgh Press.

Hirt, P. W. (1994). *Conspiracy of Optimism: Management of the National Forests Since World War Two*. Lincoln, NE: University of Nebraska Press.

Iacobucci, D. (2001). 'Special issue: Methodological and statistical concerns of the experimental behavioral researcher,' *Journal of Consumer Psychology* 10 (1–2): 75–82.

Jenkins, J. J. (1979). 'Four points to remember: A tetrahedral model of memory experiments' in L. S. Cermak and F. I. M. Craik, eds., *Levels of Processing in Human Memory.* Hillsdale, NJ: Erlbaum, pp. 429–446.

Johnson, N. K., J. Agee, R. Beschta, V. Dale, L. Hardesty, J. Long, L. Neilsen, B. Noon, R. Sedjo, M. Shannon, R. Trosper, C. Wilkinson, and J. Wondolleck (1999). 'Sustaining the people's lands: Recommendations for stewardship of the national forests and grasslands into the next century,' *Journal of Forestry* 97 (5): 6–12.

Keeney, R. (1992). *Value-focused Thinking.* Cambridge, MA: Harvard University Press.

Kennedy, J. J. (1988). 'Legislative confrontation of groupthink in U.S. natural resource agencies,' *Environmental Conservation* 15 (2): 123–128.

Kennedy, J. J., M. P. Dombeck, and N. E. Koch (1998). 'Values, beliefs and management of public forests in the western world at the close of the twentieth century,' *Unasylva* 49: 16–26.

Martin, I. M., W. E. Martin, H. Bender, and D. J. Shields (1998). 'The impact of goals on the values, attitudes, behavior framework,' *Decision Sciences Proceedings* 1: 126–130.

Martin, W. E., I. M. Martin, and D. J. Shields (2002). 'A role for values in evaluating sustainability,' Working Paper.

McKeown, B. and D. Thomas (1988). *Q Methodology.* Newbury Park: Sage Publication.

Mohai, P. and P. Jakes (1996). 'The forest service in the 1990's: Is it headed in the right direction?' *Journal of Forestry* 94 (1): 31–37.

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: McGraw-Hill.

Radin, B. A. (1998). 'The Government Performance and Results Act (GPRA): Hydra-headed monster or flexible management tool?' *Public Administration Review* 58 (4): 307–316.

Robertson, F. D. (1992). Statement before U.S. House of Representatives Subcommittee on Forests, Family Farms, and Energy Committee on Agriculture concerning H.R. 1969 on 'Clearcutting and Ecosystem Management', June 16, 1992.

Rokeach, M. (1973). *The Nature of Human Values*. NY: The Free Press.

Sabatier, P., J. Loomis, and C. McCarthy (1996). 'Policy attitudes and decisions within the forest service,' *Journal of Forestry* 94 (1): 42–46.

Schwartz, S. H. (1992). 'Universals in the context and structure of values' theoretical advances and empirical tests in 20 countries,' in M. P. Zanna, ed., *Advances in Experimental Social Psychology.* San Diego, CA: Academic Press, 25, pp. 1–66.

Shields, D. J., I. M. Martin, W. E. Martin, and M. Haefele (2002). 'Survey results of the American public's values, objectives, beliefs, and attitudes regarding forests and grasslands,' *RMRS-GTR-95,* Rocky Mountain Research Station, Fort Collins, CO.

Steelman, T. A. and L. Maguire (1999). 'Understanding participant perspectives: Q-methodology in national forest management,', *Journal of Policy Analysis and Management* 18 (3): 361–388.

Tipple, T. J. and J. D. Wellman (1991). 'Herbert Kaufman's rorest ranger 30 years later: From simplicity and homogeneity to complexity and diversity,' *Public Administration Review* 51 (5): 421–428.

Twight, B. (1983). *Organizational Value and Political Power: The Forest Service versus the Olympic National Park*. Pennsylvania State University Press: University Park.

Wood, C. A. (2000). 'The next decade of the forest service: Does the past hold the key to the future?' in R. A. Sedjo, ed., *A Vision for the U.S. Forest Service: Goals for its Next Century*, pp. 49–56.

Xu, Z. and D. N. Bengston (1997). 'Trends in national forest values among forestry professionals and the news media: 1982–1993,' *Society and Natural Resources* 10: 43–59.

APPENDIX A: Individual Public Land Value Scale Statements and Factor Loadings

	Factor loadings	Item-total correlations
Factor 1: Socially responsible individual behavior values		
People should be more concerned about how our public lands are used.	0.63	0.59
Natural resources must be preserved even if people must do without some products.	0.85	0.80
Consumers should be interested in the environmental consequences of the products they purchase.	0.78	0.68
I am willing to sign a petition for an environmental cause.	0.80	0.76
The whole pollution issue has never upset me since I feel it's overrated.	–0.82	–0.75
I have often thought that is we could just get by with a little less there would be more for future generations.	0.75	0.69
Manufacturers need to be encouraged to use recycled materials in their manufacturing and processing operations.	0.61	0.56
Future generations are as important as the current one in the decisions about public lands.	0.59	0.64
I would be willing to pay five dollars more each time I use public lands for recreational purposes.	0.42	0.40
People should urge their friends to limit their use of products made from scarce resources.	0.78	0.73
I am glad there are National Forests even if I never get to see them.	0.46	0.56
People can think public lands are valuable even if they do not actually go there themselves.	0.52	0.58
I am willing to stop buying products from companies that pollute the environment even though it might be inconvenient.	0.83	0.75
I am willing to make personal sacrifices for the sake of slowing down pollution.	0.78	0.71
Forests have a right to exist for their own sake, regardless of human concerns and uses.	0.77	0.88
Wildlife, plants and humans have equal rights to live and grow.	0.71	0.84
Donating time or money to worthy causes is important to me.	0.43	0.41
Factor two: Socially responsible management values		
I think that the public land managers are doing an adequate job of protecting natural resources from being over used.	0.53	0.63
The primary use of forests should be for products that are useful to humans.	0.81	0.83
The federal government should subsidize the development and leasing of public lands to companies.	0.53	0.60

	Factor loadings	Item-total correlations
The government has better places to spend money than devoting resources to a strong conservation program.	0.70	0.75
We should be actively harvesting more trees to meet the needs of a much larger human population.	0.74	0.84
The most important role for public lands is providing jobs and income for local people.	0.76	0.78
The decision to develop resources should be based mostly on economic grounds.	0.78	0.82
The main reason for maintaining resources today is so we can develop them in the future.	0.58	0.68

APPENDIX B: Means and Standard Deviations for the Public Land Values

Item name	Field n = 29 Mean (sd)	WO n = 37 Mean (sd)	Both n = 66 Mean (sd)
Socially responsible individual values:			
Concern for public lands	4.31 (.89)	4.45 (.64)	4.39 (.76)
Preserve natural resources	3.96 (.68)	3.86 (.97)	3.91 (.81)
Environmental consequences of products	4.51 (.51)	4.59 (.60)	4.56 (.55)
Sign a petition for environmental cause	3.72 (.41)	3.89 (.31)	3.81 (.34)
Pollution issue is overrated	3.65 (.84)	3.54 (.73)	3.56 (.78)
Consume less	4.00 (.90)	3.81 (.98)	3.89 (.91)
Manufacturers use recycled materials	4.68 (.54)	4.72 (.56)	4.71 (.54)
Future generations are important	4.65 (.67)	4.67 (.58)	4.66 (.61)
Pay recreation fees to use public lands	4.00 (.33)	3.91 (.27)	3.95 (.29)
Limit use of scarce resources	3.86 (.74)	3.79 (.17)	3.81 (.94)
National Forests must exist	4.97 (.19)	4.91 (.27)	4.93 (.24)
National Forests are important	4.96 (.19)	4.86 (.34)	4.90 (.29)
Avoid products that pollute	4.34 (.86)	4.25 (.22)	4.27 (.93)
Make personal sacrifices to stop damage to public lands	4.62 (.56)	4.53 (.64)	4.56 (.61)
Forests have a right to exist	3.68 (.49)	3.71 (.33)	3.70 (.39)
Wildlife, plants & humans have equal rights	2.89 (.51)	3.09 (.50)	3.02 (.51)
Donate time or money to help out	4.41 (.78)	4.48 (.65)	4.45 (.70)
Overall mean (s.d.) of SRIV	**4.19 (.44)**	**4.18 (.46)**	**4.18 (.45)**

Item name	Field n = 29 Mean (sd)	WO n = 37 Mean (sd)	Both n = 66 Mean (sd)
Socially responsible management values:			
PL mgrs are protecting public lands	4.08 (.33)	3.98 (.21)	4.02 (.24)
Primary use of forests is for human products	4.11 (.86)	4.09 (.82)	4.10 (.83)
The govt should subsidize development & leasing	4.29 (.86)	4.22 (.78)	4.24 (.75)
Subsidies of conservation programs	3.76 (.57)	3.82 (.90)	3.79 (.96)
Actively harvest timber to meet human needs	4.11 (.68)	4.25 (.91)	4.19 (.88)
PL must provide jobs & income for local people	3.66 (.20)	3.72 (.47)	3.68 (.44)
Decision to develop based on economic grounds	4.32 (.68)	4.57 (.64)	4.35 (.66)
Protect resources for future use	4.44 (.23)	4.43 (.49)	4.43 (.74)
Overall mean (s.d.) of SRMV	**4.10 (72)**	**4.14 (.67)**	**4.10 (.69)**

APPENDIX C: Factor Loading for Objectives Related to Public Land Management

Factor name	Factor loading	Item-total correlation
Access factor:		
1. Expand access	0.37	0.44
2. Designate trails	0.34	0.51
3. Build paved roads	0.47	0.48
4. Expand commercial recreation	0.49	0.53
5. Institute recreation fees	0.56	0.61
Preservation factor:		
1. Conserve public land waters	0.73	0.66
2. Protect the ecosystem	0.78	0.71
3. Preserve the wilderness experience	0.53	0.51
4. Provide natural resources to dependent communities	0.44	0.38
5. Restrict timber & grazing	0.38	0.34
6. Restrict extractive uses	0.49	0.56
Local & public involvement factor:		
1. Preserve local cultural uses of public lands	0.59	0.52
2. Develop a national policy for resource uses	0.62	0.54
3. Inform public on environmental impacts	0.32	0.41
4. Inform public on economic value of developing resources	0.69	0.56

Factor name	Factor loading	Item-total correlation
5. Encourage collaboration	0.73	0.71
6. Allow for diverse uses	0.38	0.35
7. Keep management decisions at local level	0.31	0.30
Active stewardship factor:		
1. Develop volunteer programs to improve public lands	0.79	0.71
2. Develop volunteer programs to maintain facilities & trails	0.84	0.81
3. Preserve local cultural uses of public lands	0.45	0.52
Total scale reliability coefficient	0.66	

APPENDIX D: Means and Standard Deviations for Objectives for Managing Public Lands

Factor Name	Field Mean (sd)	WO Mean (sd)	both Mean (sd)
A. Access dimension:			
1. Expand access	2.31 (.98)	2.35 (.89)	2.32 (.96)
2. Designate trails	3.24 (.85)	3.97 (.95)	3.65 (.91)
3. Build paved roads	1.89 (.31)	2.02 (.25)	1.95 (.24)
4. Expand commercial recreation	2.44 (.73)	3.01 (.74)	2.70 (.77)
5. Institute recreation fees	3.46 (.82)	3.31 (.67)	3.41 (.78)
Overall factor mean	**2.73 (.76)**	**2.88 (.73)**	**2.81 (.76)**
B. Preservation dimension:			
1. Conserve public land waters	4.92 (.36)	4.86 (.79)	4.88 (54)
2. Protect the ecosystem	4.91 (.55)	4.86 (.39)	4.88 (.44)
3. Preserve the 'wilderness' experience	4.51 (.31)	4.45 (.78)	4.49 (.61)
4. Provide natural resources to dependent communities	3.64 (.88)	3.63 (.64)	3.63 (.62)
5. Restrict timber & grazing	2.87 (.57)	3.02 (.35)	3.00 (.31)
6. Restrict extractive uses	3.21 (.49)	3.25 (.50)	3.23 (.49)
Overall factor mean	**4.01 (.44)**	**4.01 (.45)**	**4.01 (.39)**
C. Local and public involvement dimension:			
1. Preserve local cultural uses of public lands	4.54 (.39)	4.41 (.55)	4.46 (.24)
2. Develop a national policy for resource uses	3.88 (.92)	3.91 (.76)	3.88 (.81)
3. Inform public on environmental impacts	4.68 (.63)	4.69 (.59)	4.69 (.61)
4. Inform public on economic value of developing resources	4.29 (.34)	3.98 (.39)	4.18 (.44)

Factor	Name	Field Mean (sd)	WO Mean (sd)	both Mean (sd)
5.	Encourage collaboration	4.79 (.22)	4.64 (.12)	4.72 (.29)
6.	Allow for diverse uses	4.35 (.37)	4.21 (.34)	4.33 (.36)
7.	Keep management decisions at local level	3.67 (.67)	3.64 (.48)	3.65 (.51)
	Overall factor mean	**4.31 (.51)**	**4.21 (.55)**	**4.27 (.43)**
D.	*Active stewardship dimension:*			
1.	Develop volunteer programs to improve public lands	4.37 (.52)	4.43 (.49)	4.41 (.49)
2.	Develop volunteer programs to maintain facilities & trails	4.29 (.68)	4.41 (.93)	4.36 (.88)
3.	Preserve local cultural uses of public lands	4.54 (.39)	4.31 (.55)	4.40 (.24)
	Overall factor mean	**4.40 (.58)**	**4.39 (.61)**	**4.39 (.55)**

Appendix E: LT Z-Scores for Each Statement

Statement and statement number		Factor		
		1	2	3
1)	Expanding access for motorized off-highway vehicles on forests and grasslands.	–1.616	–.752	–.314
2)	Designating some existing recreation trails for specific use.	–.152	–.505	.996
3)	Developing new paved roads on forests and grasslands for cars and recreational vehicles.	–1.706	–1.803	.016
4)	Conserving and protecting forests and grasslands that are the source of our water resources, such as streams, lakes, and watershed areas.	.967	1.050	1.427
5)	Protecting ecosystems and wildlife habitats.	.942	.573	1.144
6)	Preserving the ability to have 'wilderness' experience on forests and grasslands.	.869	.090	.702
7)	Preserving the cultural uses of forests and grasslands by Native Americans and Native Hispanics such as firewood gathering, herb/berry/plant gathering, and ceremonial access.	.516	1.063	.677
8)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.	–.522	.951	.461
9)	Restricting mineral development on forests and grasslands.	.288	–1.420	.202

Statement and statement number	Factor		
	1	2	3
10) Restricting timber harvesting and grazing on forests and grasslands.	–.135	–1.420	–.228
11) Developing a national policy that guides natural resource development of all kinds.	.390	.440	.679
12) Expanding commercial recreation on forests and grasslands.	–1.208	–1.364	.444
13) Developing volunteer programs to improve forests and grasslands	.683	.493	.592
14) Developing volunteer programs to maintain trails and facilities on forests and grasslands.	.719	.460	.659
15) Informing the public on the potential environmental impacts of all uses associated with forests and grasslands.	.824	1.099	.328
16) Informing the public on the economic value received by developing our natural resources.	.062	1.102	.610
17) Encouraging collaboration between groups in order to share information concerning uses of forests and grasslands.	.737	1.214	1.347
18) Allowing for diverse uses of forests and grasslands such as grazing, recreation, and wildlife habitat.	.285	1.042	1.090
19) Making management decisions concerning the use of forests and grasslands at the local level rather that at the national level.	–.384	.962	–.491
20) Paying an entry fee that goes to support public lands.	.067	–.101	.669
21) People should be more concerned about how our public lands are used.	.792	.304	.475
22) Natural resources must be preserved even if people must do without some products.	.541	–.354	–.426
23) Consumers should be interested in the environmental consequences of the products they purchase.	.853	.779	.414
24) I would be willing to sign a petition for an environmental cause.	.567	–.381	–.615
25) The whole pollution issue has never upset me too much since I feel it is somewhat overrated.	–1.872	–1.022	–1.918
26) I have often though that if we could just get by with a little less there would be more left for future generations.	.514	–.003	–.568
27) Manufacturers should be encouraged to use recycled materials in their manufacturing operations.	.963	.924	.786
28) Future generations should be as important as the current one in the decisions about public lands.	.952	.669	.853
29) I would be willing to pay five dollars more each time I use public lands for recreational purposes.	.594	–1.255	.527

Statement and statement number	Factor		
	1	2	3
30) People should urge their friends to limit their use of products made from scarce resources.	.487	.177	–.477
31) I am glad there are National Forests even if I never get to see them.	.982	1.420	1.170
32) People can think public lands are valuable even if they do not actually go there themselves.	1.009	1.420	1.268
33) I am willing to stop buying products from companies that pollute the environment even thought it might be inconvenient.	.728	.418	.234
34) I am willing to make personal sacrifices for the sake of slowing down pollution.	.817	.951	.419
35) Forests have a right to exist for their own sake, regardless of human concerns and uses.	.812	–.702	–1.702
36) Wildlife, plants, and humans have equal rights to live and grow.	.388	–1.958	–1.388
37) Donating time or money to worthy causes is important to me.	.818	.849	.229
38) We should actively harvest more trees to meet the needs of a much larger human population.	–1.442	.431	–1.453
39) The most important role for the public lands is providing jobs and income for local people.	–1.524	–.848	-1.652
40) The decision to develop resources should be based mostly on economic grounds.	–1.805	–1.062	–1.728
41) The main reason for maintaining resources today is so we can develop them in the future if we need to.	–1.245	–1.069	-1.569
42) I think that the public land managers are doing an adequate job of protecting natural resources from being over used.	–.407	.787	.380
43) The primary use of forests should be for products that are useful to humans.	–1.415	–.557	–.561
44) The Federal government should subsidize the development and leasing of public lands to companies.	–1.783	–1.432	–2.157
45) The government has better places to spend money than devoting resources to a strong conservation program.	–1.952	–1.662	–1.549

APPENDIX F: Washington Office Z-Scores for Selected Statements

		Factor		
		1	2	3
Distinguishing statements for Factor 1: Biocentric preservation				
4)	Conserving and protecting forests and grasslands that are the source of our water resources, such as streams, lakes, and watershed areas.	.946	1.046	1.361
5)	Protecting ecosystems and wildlife habitats.	.908	–1.520	1.231
6)	Preserving the ability to have 'wilderness' experience on forests and grasslands.	.914	–.295	.865
28)	Future generations should be as important as the current one in the decisions about public lands.	.939	–.043	1.090
35)	Forests have a right to exist for their own sake, regardless of human concerns and uses.	.774	–1.861	–.832
36)	Wildlife, plants, and humans have equal rights to live and grow.	.385	–1.811	–1.036
8)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.	–.515	1.205	.521
19)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.			
1)	Expanding access for motorized off-highway vehicles on forests and grasslands.	–1.740	.002	–.656
3)	Developing new paved roads on forests and grasslands for cars and recreational vehicles.	–1.709	–.894	–.170
Distinguishing statements for Factor 2: Commodity management with local focus				
9)	Restricting mineral development on forests and grasslands.	.398	–1.702	–.082
10)	Restricting timber harvesting and grazing on forests and grasslands.	–.139	–1.702	.094
18)	Allowing for diverse uses of forests and grasslands such as grazing, recreation, and wildlife habitat.	.191	1.381	.673
35)	Forests have a right to exist for their own sake, regardless of human concerns and uses.	.774	–1.861	–.832
19)	Making management decisions concerning the use of forests and grasslands at the local level rather that at the national level.	–.424	1.029	–.393

		Factor		
		1	2	3
8)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.	–.515	1.205	.521
7)	Preserving cultural uses on forests and grasslands by Native Americans and Native Hispanics such as firewood gathering, herb/berry/plant gathering, and ceremonial access.	.487	.749	.731
15)	Informing the pubic on the potential environmental impacts of all uses associated with forests and grasslands.	.786	1.079	.446
16)	Informing the public on the economic values received by developing our natural resources.	.026	1.079	.802
17)	Encouraging collaboration between groups in order to share information concerning uses of forests and grasslands.	.676	1.381	.925
Distinguishing statements for Factor 3: Multiple use				
4)	Conserving and protecting forests and grasslands that are the source of our water resources, such as streams, lakes, and watershed areas.	.946	1.046	1.361
5)	Protecting ecosystems and wildlife habitats.	.908	–.152	1.231
28)	Future generations should be as important as the current one in the decisions about public lands.	.939	–.043	1.090
31)	I am glad there are National Forests even if I never get to see them.	.968	1.331	.998
8)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.	–.515	1.205	.521
18)	Allowing for diverse uses of forests and grasslands such as grazing, recreation, and wildlife habitat.	.191	1.381	.673
7)	Preserving cultural uses on forests and grasslands by Native Americans and Hispanics such as firewood gathering, herb/berry/plant gathering, and ceremonial access.	.487	.749	.731
17)	Encouraging collaboration between groups in order to share information concerning uses of forests and grasslands.	.676	1.381	.925

APPENDIX G: Field Z-Scores for Selected Statements

Statement and statement number		Factor 1	Factor 2
1)	Expanding access for motorized off-highway vehicles on forests and grasslands.	–1.215	–.934
3)	Developing new paved roads on forests and grasslands for cars and recreational vehicles.	–1.712	–1.693
4)	Conserving and protecting forests and grasslands that are the source of our water resources, such as streams, lakes, and watershed areas.	1.051	1.192
5)	Protecting ecosystems and wildlife habitats.	1.051	1.153
6)	Preserving the ability to have 'wilderness' experience on forests and grasslands.	.758	.763
7)	Preserving the cultural uses of forests and grasslands by Native Americans and Native Hispanics such as firewood gathering, herb/berry/plant gathering, and ceremonial access.	.536	.881
8)	Providing natural resources from forests and grasslands to support communities dependent on grazing, mining, or timber harvesting.	–.435	.325
9)	Restricting mineral development on forests and grasslands.	–.154	–.833
10)	Restricting timber harvesting and grazing on forests and grasslands.	–.357	–1.391
13)	Developing volunteer programs to improve forests and grasslands.	.289	.838
15)	Informing the public on the potential environmental impacts of all uses associated with forests and grasslands.	.917	.853
17)	Encouraging collaboration between groups in order to share information concerning uses of forests and grasslands.	.868	1.272
18)	Allowing for diverse uses of forests and grasslands such as grazing, recreation, and wildlife habitat.	.516	1.008
19)	Making management decisions concerning the use of forests and grasslands at the local level rather that at the national level.	–.318	.689
20)	Paying an entry fee that goes to support public lands.	.207	–.462
28)	Future generations should be as important as the current one in the decisions about public lands.	1.015	.875
35)	Forests have a right to exist for their own sake, regardless of human concerns and uses.	.908	–.777
38)	We should actively harvest more trees to meet the needs of a much larger human population.	–1.365	–.270