

Trends in National Forest Values among Forestry Professionals, Environmentalists, and the News Media, 1982–1993

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This study empirically analyzes the evolution of national forest values in recent years. Four broad categories of forest values are distinguished: economic/utilitarian, life support, aesthetic, and moral/spiritual. A computerized content analysis procedure was developed to identify expressions of these four forest values related to the national forests. With this procedure, changes in the forest value systems of three groups—forestry professionals, mainstream environmentalists, and the general public—were tracked over time. Forest value systems were found to have shifted over the study period, and significant differences were found between the forest value systems of the three groups. Implications of this study for ecosystem management are discussed.

Keywords content analysis, ecosystem management, forest values, generalized logit model, national forests

The evolution of forest values is currently being widely discussed and debated in the forestry community. It is often claimed that a fundamental shift in forest values has taken place in recent decades. For example, historian Samuel Hays (1988) has claimed, “New values have emerged about what the forest in America is and what role it ought to play in modern society” (p. 550). Shands (1991) has stated that managing the national forests in ways that are responsive to changing public values is the core problem faced by the U.S. Department of Agriculture (USDA) Forest Service. Gordon (1994) has argued that a shift in public values is part of the explanation for the declining influence of the multiple-use sustained yield paradigm of forest management. It is increasingly recognized that the val-

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ues people hold about forest ecosystems are an important part of the social underpinning of ecosystem management, the emerging forest management paradigm. Grumbine (1994, p. 34) has gone further, arguing, "Ecosystem management is an early stage in a fundamental reframing of how humans value nature." Thus, ecosystem management can be viewed as a response to changing values or as a driving force that is creating value change. In either case, forest values play a critical role in identifying ecosystem management goals, setting the context for decision making, and guiding choices.

Forest values are defined here as relatively enduring conceptions of the "good" related to forests and forest ecosystems. Value in this sense is sometimes referred to as an ideal or a held value. A more systematic understanding of recent changes in forest values is needed to develop resource management approaches that are responsive to changing forest values and to anticipate the future evolution of forest values. Several recent studies have analyzed forest and related value systems at a particular point in time (e.g., Holler, 1990; Steel et al., 1994; Vining and Ebreo, 1991). But there has been little research on how forest values—or environmental values in general—have changed over time.

This study examines change in environmental values over time by empirically analyzing published records using a content analysis procedure. Content analysis is a research technique for making valid inferences from text by systematically identifying and analyzing specified characteristics within text. It has been used by social scientists for many purposes, ranging from determining the psychological state of individuals to analyzing cultural patterns of groups, institutions, or societies over time (Fan, 1988, Weber, 1990). An important premise of content analysis for the present study is that the language used in social discourse is not mere words but is an expression of values. Historian Paul Hirt (1994) has noted, "Language is a very important indicator of values and ideology. Industrial foresters use a common set of terms that both reflect and shape the perceptions and assumptions of those sharing that vocabulary" (p. 17). Changes in this language therefore reflect changes in systems of beliefs and values, which have a powerful influence on the way people think and behave. As Lakoff and Johnson (1980) have observed: "It is reasonable enough to assume that words alone don't change reality. But changes in our conceptual system do change what is real for us and affect how we perceive the world and act upon those perceptions" (pp. 145–146).

Content analysis has been used to analyze a variety of topics in forestry. One major effort in forestry has involved a system to analyze public input, which has been applied to a large number of cases and reported in many publications (e.g., Hendee et al., 1973; Hendee et al., 1974; Stankey et al., 1975; Clark and Stankey, 1976). This human-coded system, called Codinvolve, was developed in 1972 as part of a USDA Forest Service effort to improve public involvement in decision making. A human-coded content analysis of the forest industry's corporate image advertising messages was carried out by Schoenfeld et al. (1980). Changing public attitudes toward wildlife were analyzed in a large-scale study by Kellert (1985). Kellert and his associates sampled and analyzed a total of 4,873 animal-related articles from four continuously published newspapers (two urban and two rural, from different geographic regions) covering the period from 1900 to 1976. Wilson (1994) carried out a human-coded content analysis of public letters related to the forest plan revision on the Arapaho and Roosevelt National Forest and the Pawnee National Grassland. Finally, Professor Joanne Vining and several of her graduate students have carried out a content analysis of public responses to forest planning and management on the Hoosier National Forest in Indiana (Vining et al., 1994; Tyler et al., 1995).

This study used computer-coded content analysis to analyze empirically the evolution of forest values in the United States from 1982 through 1993. The authors developed

a classification system that identifies four broad categories of forest values: economic/utilitarian, life support, aesthetic, and moral/spiritual values. A content analysis procedure was developed to identify expressions of these values related to public forests in databases of text representing the views of three groups: the general public, forestry professionals, and mainstream environmentalists. The value system of each group was quantitatively summarized, and changes in value systems—that is, changes in the relative frequency of expression of values—were tracked over time. The main working hypotheses for this study were that (1) forest value systems would have shifted over the study period, and (2) significant differences would exist between the forest value systems of the three groups. A concluding section discusses the implications of this study for ecosystem management.

Four Forest Values

Forest values¹ were defined earlier as relatively enduring conceptions of the good related to forests and forest ecosystems. This study distinguishes four distinct ways in which people value forests and forest ecosystems—economic/utilitarian, life support, aesthetic, and moral/spiritual value—that are the basis of the content analysis described in the following sections. Figure 1 summarizes the relationships between these four broad types of value. Instrumental value is one concept of the good, in which the good is equated with what is useful as a means to some desirable human end. The instrumental value of the environment arises from the fact that “nature benefits us. Nature is useful: it serves a purpose, satisfies a preference, or meets a need” (Sagoff, 1991, p. 32). The instrumental value of a forest ecosystem stems from its utility as a means to specific ends or the realization of other values. For example, sawtimber is prized not for its own sake, but rather for its usefulness in building things that increase human welfare or well-being.

Economic, or more broadly, utilitarian value is a type of instrumental value. Like instrumental value in general, the economic/utilitarian value of a forest ecosystem stems from its utility for achieving human ends, where the ultimate end or goal is maximizing preference satisfaction. Maximizing pleasure or happiness was the ultimate goal of classical utilitarians, whereas contemporary utilitarians and mainstream economists focus on the goal of maximizing preference satisfaction (Sagoff, 1988; Wenz, 1988). The eco-

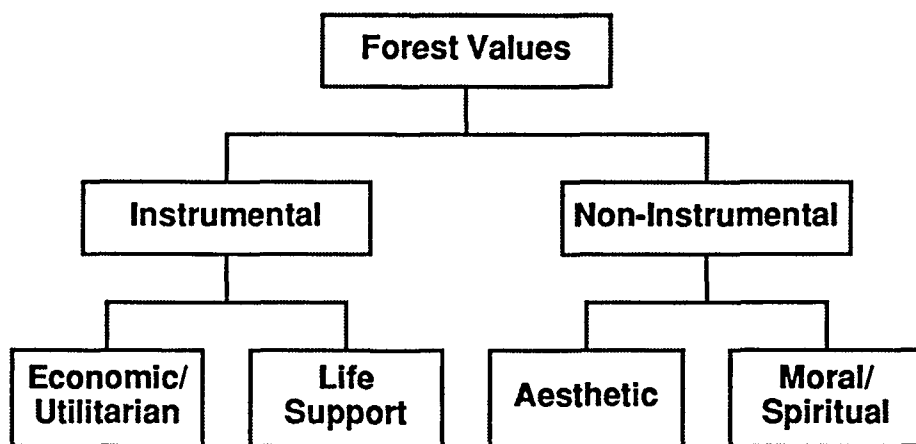


Figure 1. National forest value time trends.

conomic conception of the value of nature focuses on the usefulness of nature as expressed in individual preferences or an aggregation of individual preferences.

Life support value is another broad concept of what is instrumentally good about forest ecosystems. For people who hold this value, life-supporting environmental functions and services are good because human well-being depends on them. Unlike economic value, life support value is not adequately measured by an aggregation of people's preferences for environmental functions and services. Many people are unaware of the life-supporting benefits that ecosystems provide, so aggregating preferences or willingness to pay for life-supporting environmental services does not produce a meaningful measure of their importance. The benefits exist whether or not people are aware of the role of forest ecosystems in providing them. Life support values of the environment are as essential to all economic activity and to life itself as the foundation of a building is to its structural integrity. The perception of life support value requires an observer or valuer who understands why the foundation is essential—someone who understands how ecosystems work and what life-supporting services they provide.

The concept of noninstrumental value focuses on the worth of something as an end in itself, rather than a means to some end. Humans value their children, their spouses, and other humans in this way, in addition to valuing them instrumentally for the benefits received from them. They have "a good of their own"; they cannot be substituted for or replaced. Many people value forests noninstrumentally, in ways that go beyond their contribution to self-interested goals.

Aesthetic value is a type of noninstrumental value, in which the concept of what is good is beauty. Sagoff (1991) has noted that nature may be valued as an object of knowledge and perception, his definition of aesthetic value. According to this view, the basis of the aesthetic value of forests is not in the benefits that people receive from them, but in naturally occurring qualities of forests themselves. The perception of aesthetic value, however, requires an informed and discriminating observer or valuer. Aesthetic value has historically had and continues to have profound impacts on public land policy and management: "One of the main reasons that we have set aside certain natural areas as national, state, and county parks is because they are considered beautiful" (Callicott, 1992, p. 12).

Finally, moral/spiritual value is also a type of noninstrumental value. Humans value an object morally when they regard it with love, affection, reverence, and respect (Sagoff, 1991). This is what Aldo Leopold (1966) had in mind when he wrote: "It is inconceivable to me that an ethical relation to land can exist without love, respect, and admiration for land, and a high regard for its value. By value, I of course mean something far broader than mere economic value" (p. 261). Spiritual value is a type of moral value. Environmental psychologists and philosophers have studied the spiritual value of forests and trees. One environmental psychologist has defined spiritual as "the experience of being related to or in touch with an 'other' that transcends one's individual sense of self and gives meaning to one's life at a deeper than intellectual level" (Schroeder, 1992, p. 25). The spiritual value of forests and all the life contained within them is often expressed in the writings of Native Americans (Jostad, 1994). Attachment orientation to nature (Mitchell et al., 1993; Williams et al., 1992), "topophilia," or sense of place (Tuan, 1974; Turner, 1989), and heritage value (Hammond, 1985; Rolston, 1985) are also included in this broad category.

This four-part classification system for forest values is used in this study as a framework for analyzing change in national forest values over time. However, it is necessary to discuss a caveat about the classification system before proceeding: This system of distinctly different values does not deny the interweaving of values. For example, a house

can both provide basic shelter and be gratifying to the eye of its beholder. An advertisement can serve both a commercial and an aesthetic interest. Similarly, forests are always valued in multiple ways simultaneously. In discussing the interweaving of values, Perry (1954, p. 326) has noted: "There is no situation, practical or cognitive, which is not also an aesthetic situation. Nor is there any aesthetic situation which does not tend to knowledge or action. Whichever attitude dominates will carry the others on its back or in its train. . . . This mobility and subtlety of interblending is an unquestionable fact, which, however, must not be allowed to blur the differences, and obscure the fact that the aesthetic interest has a distinct motivation of its own." The fact that forest values are intimately interwoven does not contradict the view that each forest value has a distinct motivation that is relevant to public forest policy and management.

Method

The heart of any content analysis is the coding scheme—a system for classifying text, designed to achieve the objectives of a particular study. The first step in developing a coding scheme is to define the content categories, which in this study are the four types of forest value described in the preceding section. One objective of this study was to produce a set of reliable and valid indicators of the expression of these four broad categories.

A second step in developing a coding scheme is to define the basic unit of text to be classified. Individual words and phrases, sentences, paragraphs, and whole texts may be used as the unit of text for analysis. Choice of an appropriate unit of text depends on the specific research questions of interest. For certain purposes, large units of text are quite appropriate. But Weber (1990) has noted that it is often difficult to achieve high reliability when coding large units of text. This study uses individual words and phrases as the basic unit of text to be classified. This approach is most appropriate given the interweaving of forest values. For example, the sentence "The production of *goods and services* is essential, but it does not preclude maintaining the natural *beauty* of forests" expresses both economic/utilitarian value (as indicated by the phrase "goods and services") and aesthetic value (as indicated by the word "beauty"). By classifying individual words and phrases rather than larger units of text, the content analysis procedure can account for multiple expressions of forest values within a given text.

The third step is to develop lists of words and phrases—"dictionaries" in the nomenclature of content analysis—associated with each of the content categories (Fan, 1988) to serve as indicators of the concepts of interest. Forest values, as abstract concepts, are not capable of being observed directly; dictionaries enable researchers to observe indirectly and to quantify expressions of forest values. Development of the forest value dictionaries involved an iterative process: Initial dictionaries were developed for each value category by examining forestry-related texts that clearly expressed a particular type of value. Articles by forest economists, traditional foresters, and others focusing on economic and utilitarian values associated with forests were examined to identify an initial list of words and phrases expressing the economic or utilitarian value of forests. Similarly, the writings of forest ecologists and others focusing on ecological functions and values were examined to identify words expressing life support value; the writings of landscape architects, aestheticians, environmental philosophers, and others were examined to identify indicators of aesthetic value; and the writings of environmental philosophers, environmental psychologists, Native Americans, and others were examined to identify indicators of moral or spiritual value. Almost eighty documents were examined in the development of the initial forest value dictionaries.²

Each of these initial value dictionaries were then sent to subject matter specialists for review and refinement. A landscape architect who conducts research on the aesthetic value of forests reviewed the initial aesthetic value dictionary, an environmental psychologist involved in research on the spiritual value of forests reviewed the moral/spiritual value dictionary, and so on. The subject matter specialists were asked to comment on the dictionaries and suggest additional words and phrases to express forest values within their areas of expertise.

The next step—examining the use of the words and phrases in the databases of text—was crucial in refining the value dictionaries and ensuring their validity. As Weber (1990) has noted, “A content analysis variable is valid to the extent that it measures the construct the investigator intends it to measure” (p. 15). Three databases of text on the national forests (described in the following section) were used to examine computer-generated key-word-in-context (KWIC) lists to determine which of the words and phrases contained in the draft value dictionaries were accurate indicators of the expression of the four values.³ Words and phrases found to be used ambiguously or incorrectly for this study were dropped from the dictionaries. For example, the word *spirit* was originally included in the moral/spiritual value dictionary, but it was found to be used as an expression of the moral or spiritual value of forests only about 16% of the time. Such phrases as “a spirit of compromise” and “a cooperative spirit,” which do not express the moral/spiritual value of forests, were often found. The word *spirit* was therefore dropped from the moral/spiritual value dictionary. Many other words and phrases were dropped because they were found to be poor indicators of the expression of forest values.

The process of refining the dictionaries by applying them to a large sample of text, assessing the accuracy of their coding in context, and revising them as needed was repeated until a satisfactory level of validity was achieved. A “satisfactory” level was defined as correct usage 80% of the time or more—a rule of thumb sometimes used in content analysis of this type. A final validity check of each of the four dictionaries on a representative random sample of text from each of the three databases revealed that the dictionaries were accurately picking up expressions of value with a minimum of 80% accuracy, and most of the words and phrases contained in the dictionaries were valid value indicators 90% to 95% of the time.

In addition to validity in content analysis, the reliability or consistency of text classification is a concern when multiple human coders are used (e.g., Kellert, 1985; Vining et al., 1994). Despite a well conceived set of coding rules and careful training of human coders, people inevitably introduce variability in how they interpret and apply category definitions or other coding rules. This study used computer coding to avoid problems with coder reliability; the computer always applies the coding rules consistently.

The final forest value dictionaries contained more than 600 words and phrases.⁴ The economic/utilitarian value dictionary included actors that fill various roles related to utilitarian values (e.g., *logger, tree farmer*), various objects of utilitarian value (e.g., *goods and services, raw materials*), ends or goals related to utilitarian value (e.g., *economic development, economic growth*), and various means to achieve these ends (e.g., *exports, intensive management*).⁵

The final life support value dictionary included both the specialized language of ecologists and many words used by non-ecologists to describe various ecological functions and express life support value. Included were actors that fill roles related to life support values (e.g., *restoration ecologist, landscape ecologist*), various ecosystem functions (e.g., *carbon storage, soil stabilization, water purification*), ends or goals related to life support value and indicators of the achievement of these goals (e.g., *biodiversity, ecosys-*

tem health, keystone species), and various indicators of problems with environmental functions and loss or degradation of life support value (e.g., *acid rain, erosion, degradation, fragmentation, unraveling*).⁶

The aesthetic value dictionary included words such as *ugly*, which expresses aesthetic value by calling attention to a loss or lack of aesthetic value, as in the phrase "Clear-cuts are *ugly* scars on the land." This word list picked up both personal reflections on the aesthetic value of forests and expressions of aesthetic value found in the research literature on forest aesthetics. It was based on fairly traditional notions of forest aesthetics, but it does reflect the wide range of senses, intellectual powers, and emotions involved in the perception and appreciation of aesthetic beauty, not just visual perception (e.g., words like *emotive, fragrant, musical, orchestral, poetic, savor*).

The final moral/spiritual value dictionary contained words and phrases found to be good indicators of the expression of the moral and spiritual value of forests, including *biocentric, cherish, future generations, heritage, irreplaceable, land ethic, revered, sacred, and venerate*. This dictionary also included words such as *desecrate* and *profaned*, which indicate a loss or abuse of spiritual value.

Once the value dictionaries and coding rules were finalized, expressions of forest values were measured by applying them to databases of text; that is, with the InfoTrend software, databases were searched for the words and phrases contained in the four dictionaries. Each use of one of the words or phrases counted as one expression of the particular value. For example, the sentence "Of all the leafless trees, I think the most *beautiful* against the winter sky is the little flowering dogwood with its *graceful* horizontal limbs that reach skyward at their tips and form a fine lace pattern" (Borland, 1984, p. 5) would be counted as two expressions of aesthetic value because of the use of both *beautiful* and *graceful*, which are both included in the aesthetic value dictionary. The sentence "At one time, the chestnut occupied a *cherished*, seemingly unshakable place in the landscape" (Toner, 1985, p. 27) would be counted as one expression of moral/spiritual value because of the presence of the word *cherished*, which is included in the moral/spiritual dictionary. The value expressions were then aggregated by type of value, database, and year to develop time trends.

Data

The coding system described above—dictionaries and coding rules—was applied to databases of text on the national forests for three populations of interest: (1) the general public, (2) forestry professionals, and (3) environmentalists. The content of newspaper articles was used as a proxy for the expression of public forest values. Kellert (1985), in his landmark study of wildlife values and attitudes, argued that newspaper articles "can be relatively good indicators of generally held views and interests" (p. 20). Others have argued that, rather than reflecting the attitudes and values of their readers, the news media shape the opinions and attitudes of the public (Fan, 1988). The present authors argue that there is some truth to each of these positions—the news media both reflect and shape public values to some degree—and that therefore the news media may serve as a rough proxy for the values of the public. It is important to recognize that the use of news media text to identify expressions of national forest values for "the public" is a proxy and not a direct measure. Therefore, the value trends for this group should be interpreted more cautiously than trends for the other two groups.⁷

News media stories were obtained from the NEXIS electronic database, which contains the full texts of a large number of major and minor newspapers from all re-

gions of the United States, and a large number of national, regional, and state news services. Stories included in the database were located using the search command "national forest." For the period 1982 to 1993, NEXIS was found to contain more than 15,000 stories that included the phrase "national forest," and out of this total population, 2,000 stories were randomly retrieved for inclusion in the database. To minimize the inclusion of irrelevant text, the retrievals did not include the full text of stories. Only text within 100 words of the phrase "national forest"—50 words on either side—was downloaded. This process greatly reduced the amount of irrelevant text that would have been retrieved from stories that mentioned the national forests only in passing and helped ensure that the measured expressions of value were linked to national forests as opposed to other types of owners or land. The public/news media database consisted of 5.5 megabytes of text.

The values of forestry professionals were represented in a second database consisting of two components: (1) the complete text of keynote and general session papers presented at the Society of American Foresters National Conventions from 1982 through 1993 and (2) the complete text of articles in the *Journal of Forestry* that dealt specifically with national forests over the same period. This database was constructed by using an optical scanner to enter the text of the papers and articles. The final database representing the views of forestry professionals consisted of 415 articles, 6.7 megabytes of text.

Similarly, a database to represent the values of mainstream environmentalists was constructed by scanning in the complete text of articles dealing with the national forests from magazines published by three major forest-related environmental groups: the National Wildlife Federation's *National Wildlife*, the Sierra Club's *Sierra*, and The Wilderness Society's *Wilderness*. The National Wildlife Federation was the largest U.S. forest-related environmental organization in 1993, with 6,200,000 members (Hendee and Pitstick, 1994). The Sierra Club and The Wilderness Society were also among the largest forest-related environmental groups in 1993, with 650,000 and 310,000 members, respectively. Taken together, text from the magazines published by these three groups was considered to contain a good cross-section of expressions of the values held by mainstream environmentalists about the national forests. This database contained the full text of 238 articles, 3.1 megabytes of text.

Results

Figures 2A through 2D summarize the forest value time trends for all three groups. These figures show changes over time in the relative frequency of expression of forest values. The vertical axis is the share of a particular value as a percentage of total expressions of all four values. Therefore, if the absolute frequency of expression of one value increased while the absolute frequency of expression of the other three values remained constant, these figures would show an increase in relative frequency of expression for the one value and a decrease for the others. The trends shown in these figures have been smoothed using 3-year moving averages to reduce short-term fluctuations and to better reveal the underlying, long-term trends. The endpoints of each of the time trends (1982 and 1993) are not shown in the figures because of calculation of the 3-year moving averages.

A generalized logit model was used to test hypotheses concerning differences in forest value systems between the three groups and to test for a shift in forest value systems over time. Forest values were the response, and groups and time period were the explanatory variables. The model can be expressed as:

$$\log\left(\frac{\pi_{j^{hi}}}{\pi_{j^{li}}}\right) = \alpha_j + \beta_{hj}^s + \beta_{ij}^t$$

where:

$\pi_{j^{hi}}$ = probability of value j expressed by group h in time period i

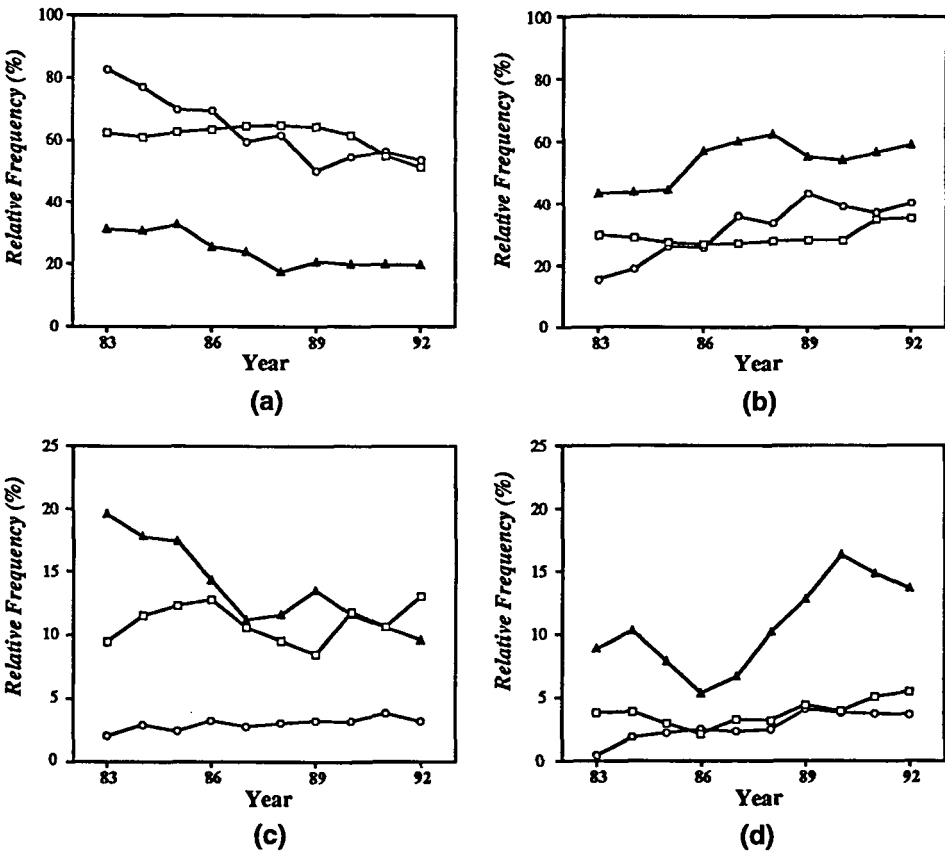
α = intercept

β^s = parameter for groups (public/news media, forestry professionals, environmentalists)

β^t = parameter for time period (where the following four time periods were used: 1982–1984, 1985–1987, 1988–1990, 1991–1993)

J = baseline category for calculating logits (moral/spiritual value)

Group effects and time effects were examined through the hypotheses $\beta^s = 0$ (no difference between groups) and $\beta^t = 0$ (no difference between time periods). G^2 tests (likelihood ratio chi-squared tests) were performed to examine these hypotheses. If the hypotheses were rejected, there would be evidence to believe that forest values differ between groups and have changed over time. The results indicated significant differences between groups ($G^2 = 1239.33, df = 6, p < .001$) and time periods ($G^2 = 185.38, df = 9, p < .001$).



Note: —□— Public/News Media; —▲— Environmentalists; —○— Forestry Professionals.

Figure 2. A typology of forest values: (a) economic/utilitarian value; (b) life support value; (c) aesthetic value; (d) moral/spiritual value.

In addition to testing these general hypotheses, the individual trends for each value and group were examined. As shown in Figure 2A, the relative frequency of expression of economic/utilitarian value declined for both environmentalists and forestry professionals. The decline for forestry professionals was particularly pronounced, with expressions of economic/utilitarian value dropping from more than 80% of total value expressions in the early 1980s to about 55% in the early 1990s. The trend for the public/news media was basically flat throughout the 1980s and then began to decline in the late 1980s. A significant gap between environmentalists and the other two groups is evident in this figure: Based on relative frequency of expression, environmentalists appear to place much less weight on the economic/utilitarian value of the national forests.

A linear probability model was used to evaluate statistically this and each of the other individual trends in forest values over time. Cochran-Armitage proportion trend tests (Agresti, 1990) were carried out to determine the statistical significance of the trends shown in Figures 2A through 2D. The value trend model can be expressed as:

$$\hat{\pi}_{ji} = p_j + b(t_i - \bar{t})$$

where: $\hat{\pi}_{ji}$ = probability of value j in time period i ($j = 1, 2, 3, 4; i = 1, 2, \dots, 12$)

p_j = sample proportion of value j in observation period

b = estimated coefficient

t_i = time period i

\bar{t} = average time period

The hypothesis that the slope b of the value trend model was zero was tested. The statistic z^2 , based on $df = 1$, tested for a linear trend in proportions (Agresti, 1990):

$$z^2 = \left(\frac{b^2}{p_j(1-p_j)} \right) \sum n_i (t_i - \bar{t})^2$$

where:

n_i = total value frequency in period i

If the model was rejected there would be significant evidence to indicate linear trends in the proportions of forest values expressed over time. The results are shown in Table 1. For economic/utilitarian value, this test provided strong evidence of a downward trend for forestry professionals and environmentalists ($p < .001$) but did not show much evidence of a trend for the public/news media over the entire 12-year period. When only the past 6 years were tested, however, the results suggested a recent downturn in relative frequency of expression of this value for the public/news media ($p < .001$), as well.

Figure 2B shows the trends in relative frequency of expression of life support value. These trends are almost a mirror image of the economic/utilitarian trends, in part because the figures show relative frequency of expression rather than absolute frequencies. The trends for environmentalists and forestry professionals were upward and fairly dramatic. The public/news media group, on the other hand, seemed to be lagging behind the other groups, with no discernible trend until its upturn in the expression of life support value in the early 1990s. As in the case of economic/utilitarian value, environmentalists stood out from the other groups—expressions of life support value of the national forests were found with greater relative frequency in the environmental literature. The Cochran-Armitage trend test yielded strong evidence of an upward trend for forestry professionals and environmentalists over the entire time period ($p < .001$), but not for the public/news media ($p > .25$). Once again, however, there was evidence of an upward trend in the past 6 years for this group ($p < .025$).

Table 1
Results of forest value trends tests for the period 1982–1993
(z^2 statistic, with p values shown in parentheses)

Group	Forest value:			
	Economic/ utilitarian	Life Support	Aesthetic	Moral/ spiritual
Forestry professionals	299.61 ($<.001$)	236.24 ($<.001$)	1.80 ($<.25$)	35.99 ($<.001$)
Environmentalists	13.85 ($<.001$)	13.34 ($<.001$)	7.46 ($<.01$)	4.68 ($<.05$)
Public/news media	2.70 ($<.1$)	1.04 ($>.25$)	0.04 ($>.25$)	2.43 ($<.25$)

Trends in the expression of aesthetic value for the national forests are shown in Figure 2C. Note that the scale on the vertical axis has changed for Figures 2C and 2D, reflecting the fact that aesthetic and moral/spiritual values were expressed much less frequently than economic/utilitarian and life support values in the text analyzed. On the basis of the trends test (Table 1), there were no obvious trends for the public or forestry professionals. But a clear downward trend was evident for environmentalists ($p < .01$), and there was evidence of a significant increase in the expression of aesthetic value by the public/news media over the past 6 years of data ($p < .025$). Forestry professionals, with a low relative frequency of expression of aesthetic value, clearly stood out from the other groups.

Finally, Figure 2D shows the trends in the relative frequency of expression of moral/spiritual value. Results of the trend test provided evidence of a significant increase in expression of this value over time by forestry professionals ($p < .001$) and environmentalists ($p < .05$), but not by the public/news media ($p < .25$). As shown in Figure 2D, environmentalists stood out with their greater relative frequency of expression of the moral/spiritual value of the national forests.

Discussion

The trends revealed in this study suggest that a gradual shift has been occurring in the structure of national forest values in the United States since the early 1980s, at least among forestry professionals and mainstream environmentalists. Given the definition of forest values as relatively enduring conceptions of what is good or desirable about forests and forest ecosystems, it seems reasonable to expect gradual change. If this analysis had found dramatic shifts in forest values over this short span of time, it would be reasonable to conclude that it was measuring something other than values, such as attitudes or opinions, which tend to be more variable. Value systems are relatively stable and change slowly. But, as the results suggest, even gradual shifts in the relative importance of values may eventually result in a significant reordering of priorities among values.

The decline in the relative frequency of expression of economic/utilitarian value and the concomitant increase in life support value among forestry professionals and environmentalists are the most striking aspects of the shift in national forest values revealed by

this analysis. The shift away from economic/utilitarian value is especially noteworthy for forestry professionals, because the philosophical base of traditional forestry is utilitarianism, and the forestry profession has been heavily influenced by economic concepts of value (Kennedy, 1985; McQuillan, 1993). The decline in economic/utilitarian value therefore suggests a fundamental change in the culture of forestry professionals. Part of the explanation for the shift away from economic/utilitarian and toward life support value among forestry professionals may be disciplinary diversification within agencies. Based on their nationwide study of USDA Forest Service employees, Brown and Harris (1993) concluded that the growing numbers of nonforesters within the agency would have a significant impact on organizational values and on the agency's resource management paradigm.

The relatively low frequency of expression of aesthetic and moral/spiritual values—particularly among forestry professionals—may in part be due to the nature of the text that was analyzed in this study. The professional forestry literature—as represented by Society of American Foresters proceedings and articles from the *Journal of Forestry*—is of a more technical or scientific nature than the other bodies of text used. Some may argue that the language of science is not comparable to that of the other texts, but the development of the aesthetic and moral/spiritual value dictionaries was structured to include words and phrases that are frequently used to express these values in the research literature. Thus, in addition to capturing the more poetic expressions of the aesthetic and moral/spiritual value of forests that are found in the environmental literature, this approach should also have captured expressions of these values that are more technical in nature. The low frequency of expression of aesthetic and moral/spiritual values in the forestry literature is therefore more likely because, although forestry has diversified, the number of forestry professionals trained in disciplines that emphasize these values (e.g., landscape architecture, environmental psychology, natural resource anthropology and sociology, etc.) is still extremely small.

Another aspect of the low frequency of expression of noninstrumental values among forestry professionals may be that these values still tend to be “closet” values, and forestry professionals are often uncomfortable with expressing such values. Therefore, they cloak their noninstrumental values as life support and economic values, which serve as proxies for aesthetic and moral/spiritual concerns. This closet phenomenon was documented by Blatt (1986) in the case of aesthetic zoning, where ordinances were often passed to protect aesthetics but were couched in phrases such as “maintenance of property values,” “promotion of community stability,” or “protection of health, safety, and general welfare.” Others have argued that many environmental preservation debates and conflicts really rest on aesthetic and moral/spiritual motivations, but justifications for preservation are often based on more defensible and “scientific” life support and economic values because the scientific and legal systems are not yet able to accept these deeper social concerns (e.g., Smardon, 1984).

The absence of trends for the public/news media and forestry professionals and the downward trend for environmentalists for aesthetic value—and the concomitant increase in life support value—may in part be because of the changing nature of environmental aesthetics. Gobster (1994, 1995) and Callicott (1992) have described an ecologically informed aesthetic. If an ecological aesthetic is beginning to replace the more traditional forest aesthetic, then it is possible that the aesthetic value dictionary in the present study is limited by its inability to identify these ecologically oriented expressions of aesthetic value.

The finding that noninstrumental values (aesthetic and moral/spiritual) were expressed less frequently than instrumental values should not be interpreted to mean that they are less important. There are at least two reasons for this finding. First, some have

argued that it is inappropriate to directly compare or trade off instrumental and noninstrumental values against each other (e.g., Sagoff, 1988; Kuntz, 1970). Instrumental and noninstrumental values are not commensurate, according to this view, and therefore cannot be meaningfully compared. This view was implicit in Rokeach's (1973) classic work and his widely used approach to analyzing human value systems. In this approach, survey respondents are asked to rank the importance of a list of instrumental values relative to each other and to rank a list of noninstrumental (or, in Rokeach's terms, "terminal") values, but no comparison of instrumental and noninstrumental values is made. Second, it cannot be assumed that one expression of a particular value is equivalent to or carries the same weight as one expression of another value. In many valuation contexts, one value is salient and determinant regardless of how widely held it is or how frequently it is expressed.

The highly statistically significant increase in the expression of moral/spiritual value by forestry professionals represents an important trend. As shown in Figure 2D, the relative frequency of expression of this value increased almost steadily over the time period analyzed. Another indicator of this trend is the adoption of a land ethic canon by the Society of American Foresters in 1992 and the subsequent discussion of this modification of the society's code of ethics (Cornett et al., 1994). Interest in and discussion of environmental ethics appear to have increased in recent years among professional foresters, perhaps in part because of the ongoing shift from a natural resource management paradigm with a utilitarian philosophical base (multiple-use forestry) to a management paradigm with a Leopoldian environmental ethic as the philosophical base (ecosystem management).

Conclusions and Implications for Ecosystem Management

These findings tend to confirm the following intuitive observation from the report of the Forest Ecosystem Management and Assessment Team (1993): "The paradox is that those social values for which our ability to define and measure is poorest, are the very ones that appear to be of increasing importance in our society" (p. VII-33). This study has found a shift in forest values away from easily defined and measured economic values toward values that are much more difficult to measure and that have often been neglected or ignored. Specifically, the life support and moral/spiritual values of national forests appear to be of increasing importance to forestry professionals, to environmentalists, and, in recent years, to the public/news media. Life support and moral/spiritual values cannot be adequately understood through the positivist-utilitarian approaches to studying environmental values that have dominated in the past (Bengston, 1994a). A much broader array of disciplinary perspectives and methods—both quantitative and qualitative—is required to increase understanding of these values. Research methods that may be useful include in-depth interviews, focus groups, content analysis, and interpretation of texts (Lewis, 1994; Patterson and Williams, 1994; Schroeder, 1994).

Second, the low frequency of expression of aesthetic and moral/spiritual values by forestry professionals relative to environmentalists may be a key to better understanding the intensity of conflict surrounding the management of the national forests. The fact that environmentalists express these values more frequently is important, because these "deeper," noninstrumental values help explain why people care so passionately about environmental issues (Williams et al., 1992; Mitchell et al., 1993; Schroeder, 1994). People typically become much more emotionally involved if their forest value system is predominantly noninstrumental in nature, in part because of their perception of a threat of loss of

something for which there is no substitute. Sagoff (1991) has identified substitutability as an important distinction between instrumental and noninstrumental value: "Insofar as we care about an object for instrumental reasons, we would accept a substitute—for example, ball point pens in place of quills—if it performs the same function at a lower cost. . . . With [noninstrumental] value, it is different" (p. 33).

The low relative frequency of expression of noninstrumental values by forestry professionals points out the need for greater understanding and appreciation of these values among foresters. Such understanding may be required to help bridge the gap in communication and worldview between public forest managers and key stakeholder groups, and it may help ameliorate conflict in forest planning and management.

Third, the finding of a statistically significant decline in the relative frequency of expression of economic/utilitarian value by forestry professionals and environmentalists, and a recent downturn in frequency of such expression by the public/news media, are noteworthy. The strong influence of economic thinking during the era of multiple-use forestry was noted by Kennedy (1985). Economic analyses of public forest management have often implicitly assumed or explicitly stated that economic efficiency should be the primary goal for the management of these forests. For example, Bowes and Krutilla (1989) have stated that "under economic multiple-use management, land should be treated over time with the sequence of activities that is expected to provide the greatest discounted net present value from the resulting flow of goods and services" (p. 32). Sagoff (1988) has pointed out the fundamental problem with this view of the role of economics in public environmental planning and management as follows: "In the past, economists have too often proposed that society pursue efficiency in the allocation of resources rather than the ethical and cultural goals stated in public law" (p. 217).

The shift in national forest values measured here may suggest a changing role for economics in the era of ecosystem management. Compared with the goal of economic efficiency and reducing the problem facing public land managers to the "optimal" choice of product mix, the goal of maintaining the health and integrity of forest ecosystems is more consistent with the values underlying ecosystem management. A broader approach to economics that is consistent with the land ethic and goals of ecosystem management is needed (Iverson and Alston, 1993). Ecological economists have begun the task of developing an economics that focuses on the sustainability of natural and social systems rather than on narrowly defined economic efficiency (see, e.g., Costanza, 1991).

Finally, the finding that the life support value of the national forests plays a prominent and growing role in the value systems of forestry professionals, environmentalists and, in recent years, the public/news media suggests that this concept of what is good about forests is now widely recognized and appreciated. The growing importance of life support value tends to confirm environmental historian Donald Worster's (1994) observation about the influence of ecology on our culture: "So influential has their branch of science become that our time might well be called the 'Age of Ecology'" (p. xiii). The observed increase in the expression of life support value suggests that ecosystem management—often characterized as being based on ecological principles and placing greater emphasis on ecological values than traditional forest management—may indeed be an idea whose time has come.

Notes

1. See Bengston (1994b) for a more detailed discussion of this values classification system.
2. Contact the authors for a copy of the list of documents examined to identify initial lists of words and phrases reflecting forest values.

3. The computer software to generate the KWIC lists and carry out the actual content analysis was InfoTrend, developed by Professor David Fan (1988), Department of Genetics and Cell Biology, University of Minnesota.

4. Contact the authors for a copy of the complete value dictionaries.

5. Examination of the use of economic/utilitarian words and phrases in the environmental literature revealed that they were usually cast in a negative or skeptical light—environmentalists frequently use economic words and phrases while expressing concern about the harmful environmental impacts of economic activities, rather than positive expressions of economic/utilitarian value. Negative expressions of economic/utilitarian value were factored out of our analysis.

6. Creighton (1983) has noted that one of the strategies for communicating values is prediction of dire consequences of a certain course of action: "The kind of consequence they fear will reflect their values. The man from the Chamber of Commerce will predict a loss of jobs, while the preservationist will predict a total disruption of the ecosystem" (p. 153). Our experience developing forest value dictionaries confirms Creighton's observation; words expressing negative, undesirable consequences were outstanding value indicators.

7. Strictly speaking, the databases of text for forestry professionals and environmentalists are also indirect reflections of the values of these groups, because the included texts are the outcome of editorial decisions by people in leadership positions rather than a random sample of the populations of interest.

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