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Attitudes Toward Ecosystem Management in the United States, 1992–1998

DAVID N. BENGSTON

North Central Research Station
USDA Forest Service
St. Paul, Minnesota, USA

GEORGE XU

Environmental Affairs Office
Washington State Department of Transportation
Olympia, Washington, USA

DAVID P. FAN

University of Minnesota
St. Paul, Minnesota, USA

Ecosystem management has been formally adopted by a large number of state and federal agencies and by forest products firms and associations. But little research has examined people's attitudes toward this new approach to natural resource management. This study used computer methods to measure favorable and unfavorable attitudes toward ecosystem management expressed in 1500 online news media stories over the period 1992 through 1998. We found that ecosystem management is on the downside of the "issue attention cycle," with the total quantity of discussion of this concept rising in the early 1990s, declining during the mid 1990s, and leveling out in recent years. We also found that about 78% of all attitudes expressed about ecosystem management in news stories have been favorable, comparable to past research based on surveys of the public. Our analysis suggests that ecosystem management may have become a "settled" (i.e., noncontroversial) issue with broad public acceptance.

Keywords attitudes, computer-coded, content analysis, ecosystem management, news media

Ecosystem management has been widely advocated as a new approach to environmental and natural resource management in the past decade. But the concept is not new. Many of its core elements can be traced back to the 1930s to a few visionary ecologists, with Aldo Leopold being the best known (Grumbine 1994). Leopold made some of the greatest advances in thinking about system-based land management during the early 1920s (Flader 1994). However, it wasn't until the late 1960s and early 1970s that ecosystem management began to be proposed as a model for natural resource

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Address correspondence to David N. Bengston, North Central Research Station, USDA Forest Service, 1992 Folwell Ave., St. Paul, MN 55108, USA. E-mail: dbengston@fs.fed.us

management (e.g., Caldwell 1968; Caldwell 1970; van Dyne 1969). Natural resource management agencies began to adopt an ecosystem approach to the management of public lands in the late 1980s and early 1990s (e.g., Dombeck 1996; Thomas 1996). By the mid 1990s, ecosystem management initiatives and activities were taking place in 18 federal agencies (Morrissey et al. 1994), and it had been adopted or endorsed by a growing number of state agencies (Brown and Marshall 1996), as well as by private firms and associations.

Ecosystem management has thus gained widespread acceptance and support among natural resource managers and policymakers. But does ecosystem management also enjoy widespread approval from the owners of the public lands on which it is being applied, that is, the general population? Relatively little research has examined the public's attitudes toward this management model and no studies have examined whether or not these attitudes have changed over time.[1] The paucity of research may be due to the fact that most people have little or no knowledge of ecosystem management (Shindler 1997; Steel et al. 1998; Tarrant et al. 1997). It is problematic to assess people's attitudes toward an unknown.

This study examines public attitudes toward ecosystem management in the United States and how they have changed over the period 1992 through 1998 using the indirect method of analyzing news media stories. These stories were scored by computer to analyze the social debate about ecosystem management. Analysis of views expressed in the news media has repeatedly produced results that parallel the findings of attitude surveys and opinion polls (e.g., Fan 1988; Kennamer 1994; West 2001; and studies cited therein), and the news media have been shown to have a strong influence on agenda setting for the general public for a wide range of issues, including those in the environmental area (e.g., see the review of more than 350 published studies on media agenda setting by Dearing and Rogers 1996). In recent years, the availability of vast amounts of news media text through online sources and the availability of a wide range of computer content analysis programs to analyze this text have made it possible to explore efficiently the views expressed in the news media and to compare them to attitude surveys and opinion polls.

The following section reviews past research on attitudes toward ecosystem management. This is followed by a summary of the data and methodology, and a discussion of the results. A final section discusses conclusions and implications. Before proceeding, however, we consider the definition of ecosystem management.

Defining Ecosystem Management

Despite the shift toward ecosystem management in the natural resource management community, a single, widely accepted definition has not emerged. This is not surprising: A single definition of traditional multiple-use natural resource management did not emerge during the decades in which this model was formulated and implemented (Hirt 1994). A model for natural resource management is too complex and dynamic—changing with new scientific understanding, professional experience, and social values—to be codified into a single definition that satisfies all stakeholders. As More (1996, 21) observed, ecosystem management is a fuzzy concept "that contains practices, techniques, goals, and objectives that share overlapping attributes or characteristics. It is defined through these characteristics, any one of which may or may not be present in a particular project." A precise definition would be limiting and is simply not in the cards, according to More, because ecosystem management is similar to the central but imprecisely defined concepts that guide other professions, such as the idea of "health" for medicine and "justice" for law.

Several researchers have characterized the main elements in ecosystem management (e.g., Gerlach and Bengston 1994; Grumbine 1994; Grumbine 1997; Lackey 1998; Cortner and Moote 1999). The following list is adapted from More's (1996) summary of the most widely discussed characteristics. The first three items are frequently mentioned goals and the next two are important perspectives of ecosystem management:

1. Maintain ecosystem health (e.g., maintain and protect ecosystem integrity and functions, restore damaged ecosystems).
2. Protect and restore biodiversity (protect native genes, species, populations, ecosystems).
3. Ensure sustainability (e.g., incorporate long time horizons, consider the needs of future generations, include both ecological and economic sustainability).
4. Systems perspective (e.g., a broad, holistic approach to management; manage at multiple spatial scales and consider the connections between different scales; coordinate across administrative, political, and other boundaries to define and manage ecosystems at appropriate scales).
5. Human dimensions (e.g., incorporate social values and accommodate human uses within ecological constraints, view humans as embedded in nature).

To this list we would add two additional characteristics that relate to the implementation of ecosystem management:

6. Adaptive management, in which management is conducted as a "continuous experiment where incorporating the results of previous actions allows managers to remain flexible and adapt to uncertainty" (Grumbine 1994, 31).
7. Collaboration, in which planning and management are joint decision-making processes that involve sharing power with key stakeholders (see Daniels and Walker 1996; Selin et al. 1997).

None of these seven interrelated characteristics alone defines ecosystem management, and all of them need not be present in a given project. In this study, rather than propose a single, unchanging definition, we recognize the diverse and evolving conceptions of ecosystem management held by various groups and individuals.

Past Research on Attitudes Toward Ecosystem Management

Public and NIPF Owner Attitudes

Table 1 summarizes past studies that have examined public attitudes toward ecosystem management, plus two studies that looked at the attitudes of nonindustrial private forest (NIPF) owners. Comparisons between studies are complicated because researchers have used different definitions or emphasized different aspects of ecosystem management. None of the studies shown in Table 1 examined attitudes toward all of the characteristics identified in the preceding section. In general, however, most people were found to hold positive attitudes toward various dimensions of ecosystem management, although considerable uncertainty surrounds this approach to natural resource management in the mind of the public. For example, in a survey of residents of the Greater Yellowstone Ecosystem, Reading et al. (1994) found that most people were supportive of a coordinated or ecosystem-wide approach to protect the wildlife and other natural features of the region. But many people also expressed concerns about decreased local control and adverse economic impacts they feared might accompany ecosystem management.

TABLE 1 Summary of Past Research on Attitudes Toward Ecosystem Management (EM) in the United States

Study	Method	Geographic focus	Dimensions of EM	Attitudes toward EM
Studies of public attitudes:				
Reading et al. (1994)	Phone and in-person surveys	Greater Yellowstone Ecosystem	Systems perspective, biodiversity	A large majority recognized the need for ecosystem-wide management, but were concerned about loss of local control
Jacobson and Marynowski (1997)	Mail survey	Department of Defense land in FL	Systems perspective, biodiversity	Neutral to slightly positive attitudes overall; greater support among neighboring citizens than recreationists
Tarrant et al. (1997)	Phone survey	National Forests in Chattooga River Basin (GA, NC, SC)	Ecosystem health, biodiversity, human dimensions, negative beliefs[a]	Generally positive attitudes toward ecosystem management, but a low level of knowledge about it
Solecki (1998)	Mail survey	Pinelands in southern NJ	Unclear—appears to include ecosystem health and biodiversity	Of those with an opinion, 75% were supportive, but 35% were neutral or had no opinion
Shindler et al. (1996)	Mail survey	Three communities in central OR	Adaptive management	Supportive 50 to 77%, but a high percentage of neutral responses

TABLE 1 *(Continued)*

Study	Method	Geographic focus	Dimensions of EM	Attitudes toward EM
Steel et al. (1998)	Mail and phone surveys	Western WA, western OR, northern CA	Ecosystem health, systems perspective, biodiversity, negative beliefs[a]	Neutral to positive attitudes toward specific dimensions or beliefs; slightly positive overall orientation
Harwood Group (1996)	Focus groups	Eight Great Plains communities in eight states	Unclear—appears to include systems perspective, human dimensions	Recognized need for EM, but many expressed concerns about impacts on livelihoods, way of life, etc.
Studies of nonindustrial private forest (NIPF) owner attitudes:				
Brunson et al. (1996)	Mail survey	Southeastern U.S., IN, UT	Ecosystem health, sustainability, systems perspective, human dimensions, adaptive management, collaboration	90% Rated EM as appropriate on public lands, and 65 to 79% rated it appropriate on private lands
Rickenbach et al. (1998)	Mail survey	Franklin County, MA	Systems perspective, sustainability, "small-scale sensitivity"	Positive attitudes toward each of the three dimensions

[a] Negative beliefs about ecosystem management were included in two surveys. These beliefs were that ecosystem management (1) will reduce the number of timber-related jobs, and (2) increase the cost of timber (Tarrant et al. 1997), and (1) is being used as an excuse for additional timber harvest, (2) is a misguided and unscientific attempt to reduce public complaints, and (3) is an attempt to take away property rights (Steel et al. 1998). Tarrant et al. also included the belief that ecosystem management will reduce timber harvesting on national forests.

Jacobson and Marynowski (1997) found neutral to slightly positive attitudes toward ecosystem management on Department of Defense land in Florida. A higher level of support for ecosystem management was found among neighboring citizens than among permitted recreational users and among respondents who were more educated, more affluent, urban, and/or participants in nonconsumptive recreation activities. Tarrant et al. (1997) found generally positive attitudes toward ecosystem management on the national forests among rural residents in the Chattooga River Basin (3 counties within Georgia, North Carolina, and South Carolina), but these attitudes were based on low levels of knowledge. About 75% of southern New Jersey residents with an opinion were supportive of an early regional ecosystem management plan, the Pinelands Comprehensive Management Plan (PCMP) (Solecki 1998). But 35% of the total number of respondents had a neutral attitude or no opinion. Previous research found that some residents were concerned about loss of property rights and local control as a result of the PCMP (Mason 1992).

Shindler et al. (1996) found that 50 to 77% supported adaptive management in three communities in central Oregon. A relatively high percentage of neutral responses was found, indicating that many people either do not fully understand adaptive management or are waiting to see how well it works before making final judgments. Neutral to positive attitudes toward six beliefs about ecosystem management were found by Steel et al. (1998) among citizens residing in western Washington, western Oregon, and northern California. An aggregate index of support revealed a slightly positive orientation toward ecosystem management. Finally, in a series of focus groups, residents of eight Great Plains communities were found to recognize the need for ecosystem management, but also expressed concerns about possible impacts on livelihoods, property rights, and their way of life (Harwood Group 1996).

At least two studies have examined the attitudes of nonindustrial private forest (NIPF) owners toward ecosystem management (Table 1). Brunson et al. (1996) found that about 90% of NIPF owners in 3 regions of the United States had positive attitudes toward the use of ecosystem management principles on public lands, and 65 to 79% rated it as appropriate on private lands. NIPF landowners in Massachusetts also held favorable attitudes toward three dimensions of ecosystem management (Rickenbach et al. 1998).

Social Acceptability of Ecosystem Management Practices

Closely related to public attitudes toward ecosystem management is the concept of social acceptability. Brunson (1996a) has defined acceptability as an attitudinal orientation that is reflected in behavior. Similarly, unacceptability is defined as an unfavorable attitude held strongly enough to motivate ameliorative behavior, such as writing an angry letter to a member of Congress or calling the local Forest Service office to complain.

Several studies have focused on the acceptability of forest management practices associated with ecosystem management, and most have used acceptability ratings—rather than observed behavior—to measure acceptability. These studies have concluded that ecosystem management practices are more socially acceptable than forest management practices such as clearcutting (e.g., Brunson and Shelby 1992; Brunson and Reiter 1996; Johnson et al. 1994; Bormann 1996; Steel et al. 1998).

In summary, as shown in Table 1, past research has found generally favorable attitudes toward ecosystem management among the public and among NIPF landowners, although several studies found a relatively high percentage of the public with a neutral

attitude or no opinion. Several studies also found concerns about ecosystem management, such as loss of local control over land management decisions and possible adverse economic impacts. Research on social acceptability has generally concluded that ecosystem management practices are more socially acceptable than certain traditional forest practices.

Methodology and Data

The goal of this study was to quantify and track over time the frequency of favorable and unfavorable attitudes toward ecosystem management expressed in news media stories. In order to better understand these attitudes and related beliefs, we began by examining a random sample of several hundred news stories about ecosystem management that were downloaded from the NEXIS online commercial database (Gongla-Coppinger 1998). The most common beliefs supporting a favorable attitude were that ecosystem management is (1) a broad and holistic approach to natural resource management, (2) required for good stewardship or represents good stewardship, (3) needed for species conservation or is more effective than traditional "species-by-species" approaches, (4) a collaborative and participatory approach to natural resource management, and (5) based on sound science. The most common beliefs supporting an unfavorable attitude were that ecosystem management is (1) vague, fuzzy, uncertain, poorly defined, or undefined, (2) difficult or impossible to implement in practice, (3) a ploy to "lock up" public land and take it out of commodity production, (4) a threat to private property rights, and (5) not based on sound science. Identification of these beliefs helped guide the development of computer content analysis rules to capture favorable and unfavorable attitudes toward ecosystem management.

Following this exploratory first step, we used the InfoTrend computer software and the high-level Filtscor computer language (Fan 1988) to carry out the following four main steps of the analysis: (1) downloading news media stories about ecosystem management from NEXIS, (2) "filtering" the text to eliminate irrelevant paragraphs (i.e., those not dealing specifically with ecosystem management), (3) developing computer instructions for coding the remaining paragraphs for the concepts of interest (favorable and unfavorable attitudes toward ecosystem management), and (4) assessing the validity or accuracy of the analysis. Each step is described next.

Downloading News Stories

Data for this analysis consisted of news stories discussing ecosystem management that were published or broadcast from 1 January 1992 through 26 December 1998. All stories were retrieved from the NEXIS online commercial database. The search command used to search NEXIS was: ((ecosystem or ecological) w/2 (manag! or approach)) or (eco! and (holistic w/2 (manag! or approach))) or (((forest service) w/p singular(new)) and (singular(new) pre/1 plural(perspectives)))), where "w/2" means "within two words," "w/p" means "within the same paragraph," and "pre/1" means "within one word before." The truncations "manag!" and "eco!" meant that any trailing letters were permitted. This search command captured stories discussing ecosystem management, ecosystem-based management, ecological management, an ecological approach to management, a holistic approach to ecological management, a holistic approach to managing ecosystems, and the Forest Service's "New Perspectives" program.

Using this search command, we identified and downloaded all the indicated 1500 stories from 24 newspapers, 5 newswires, and 4 television and radio news transcripts

contained in the NEXIS database for the entire period 1992 through 1998. Only text that was within 100 words of the search terms was downloaded. This greatly reduced the amount of irrelevant text that would have been retrieved from stories that mentioned ecosystem management only in passing.

Filtering Text

The retrieved text was filtered using the InfoTrend computer software (Fan 1988). The InfoTrend software can discard paragraphs that do not fit with user-specified criteria. Computer instructions were developed that discarded stories and paragraphs that did not discuss ecosystem management. For example, our search command inadvertently captured several stories on an "ecological approach to government and economics" and a "holistic approach to medicine," which were discarded.

Coding Paragraphs

The unit of analysis in this study was individual paragraphs. Computer instructions were developed to code the filtered text for the numbers of paragraphs expressing favorable and unfavorable attitudes toward ecosystem management. If a particular paragraph contained several expressions of favorable attitudes toward ecosystem management, it was counted as one favorable paragraph. If a paragraph contained expressions of both favorable and unfavorable attitudes toward ecosystem management, it was counted as one favorable and one unfavorable paragraph.

The InfoTrend software, using the Filtscor computer language, was used to code the text. The Filtscor language has two components. One is a set of dictionaries comprised of lists of ideas important for the topic of interest and groups of words and phrases associated with each idea. The other component is a series of idea transition rules that specify how pairs of ideas are combined to give new meanings. Developing the dictionaries and idea transition rules to capture expressions of attitudes about ecosystem management was an iterative process. In the development stage of the analysis, the coding decisions made by the still-evolving computer instructions are written to screen and the analyst modifies the dictionaries and rules until computer coding of the text agrees with the analyst's interpretation.

The following examples illustrate how the computer coding worked:

> "Some people see *ecosystem management* as a plot to grab land and *lock* it *up*" (Stuart Glascock, "Proposed international park for northern Cascades stirs debate," Washington, DC: United Press International, 25 March 1994).

This text was coded as an expression of a unfavorable attitude toward ecosystem management. Computer instructions specified that the word "lock" appearing up to 10 characters in front of the word "up" would be categorized as the concept "Lock Up," that is, locking up public lands and making them unavailable for commodity production. Another set of computer instructions then specified that the concept "Lock Up" appearing within 50 characters of the concept "Ecosystem Management" would be counted as an expression of a unfavorable attitude toward ecosystem management.

Another example of an expression of a unfavorable attitude toward ecosystem management coded by our computer instructions is the following:

> "Given that the Forest Service is currently promising such an *elusive* goal as *ecosystem management*, where neighbor relations will be stretched to extremes,

> promising too much could be fatal in the types of negotiations that are needed" (Brian J. Boyle, "Integrity of Forest Service on the line—ecosystem management means risk, challenge for embattled agency," *Seattle Times*, 11 May 1994, B5).

In this example, the word "elusive" was one of many words and phrases contained in a dictionary of unfavorable characterizations of ecosystem management. A set of computer instructions specified that a unfavorable characterization appearing within 50 characters of the concept "Ecosystem Management" would be counted as an expression of a unfavorable attitude toward ecosystem management.

An example of text coded as an expression of a favorable attitude toward ecosystem management is the following:

> "... *ecosystem approach*, said the Secretary, is 'clearly an idea whose *time has come*'" (William K. Stevens, "Restoring an ancient landscape: an innovative plan for the Midwest," *New York Times*, 2 March 1993, 1).

In this example, the phrase "time has come" was one of many words and phrases contained in a dictionary of favorable characterizations of ecosystem management. A set of computer instructions specified that a favorable characterization appearing within 50 characters of the concept "Ecosystem Management" (in this case designated by the phrase "ecosystem approach") would be counted as an expression of a favorable attitude toward ecosystem management.

Finally, the following example illustrates the use of a dictionary of "Negation" terms in the coding rules:

> "The Republicans, including those in Washington's Congressional delegation who've lived through the owl crisis, however, have shown *no interest in* the *ecosystem approach*" (Terry Tang, "Congress' dismal response to Endangered Species Act," *Seattle Times*, 29 March 1995, B4).

In this text, the phrase "interest in" was included in our dictionary of favorable characterizations of ecosystem management, and the word "no" was one the words in a dictionary of "Negation" terms (e.g., failed, insufficient, ill-suited, lack, no, not, can't, never, poorly, etc.). Computer instructions specified that a "Negation" term appearing up to 20 characters ahead of a favorable characterization would change the meaning to a unfavorable characterization of ecosystem management. As shown earlier, unfavorable characterization appearing within 50 characters of the concept "Ecosystem Management" was coded as an expression of an unfavorable attitude toward ecosystem management.

Developing the content analysis dictionaries and idea transition rules involves continuous testing by applying them to random samples of text, examining the accuracy and comprehensiveness of the coding decisions that were made, revising the dictionaries and idea transition rules as needed, and retesting. When the dictionaries and rules reached the point of being accurate and comprehensive in their coding, a formal validity analysis was carried out.

Checking Validity

A content analysis variable is valid to the extent that it measures the concept it was intended to measure. We examined a random sample of about 350 stories that were

coded using our final set of computer instructions to determine whether they were able to accurately identify favorable and unfavorable attitudes toward ecosystem management. The accuracy rates were both greater than 80%, a rule of thumb sometimes used in content analysis.

Findings

Figure 1 shows the number of paragraphs about ecosystem management each quarter that were contained in our database of news stories. The volume of discussion is low relative to many natural resource issues (cf. Bengston and Fan 2000). Note that the number of paragraphs per quarter shown in this figure is not the total U.S. news media discussion of ecosystem management, but only the paragraphs explicitly discussing it in our set of 33 news sources. Our database contained an average of about 80 paragraphs per quarter over the entire 7-year period. This relatively low volume is due in part to the fact that we only downloaded text that was within 100 words of the term ecosystem management rather than the full text of articles. But it is also due to ecosystem management being a highly specialized topic that is barely on the news media's and public's "radar screen." Several studies have found little awareness of ecosystem management by the public (e.g., Shindler 1997; Steel et al. 1998; Tarrant et al. 1997).

The "issue attention cycle" (Downs 1972) for ecosystem management is evident in Figure 1 (a fourth-order polynomial equation helps illustrate this pattern in the data over time).[2] Media discussion increased in 1992–1993, followed by a period of gradual decline and leveling off. This cycle is common to many public issues, including natural resource and environmental issues. Since the number of paragraphs per quarter shown in this figure is derived from a constant set of news sources over the entire time period, the increase in volume of discussion during 1992–1993 was not due to additional news sources becoming available online.

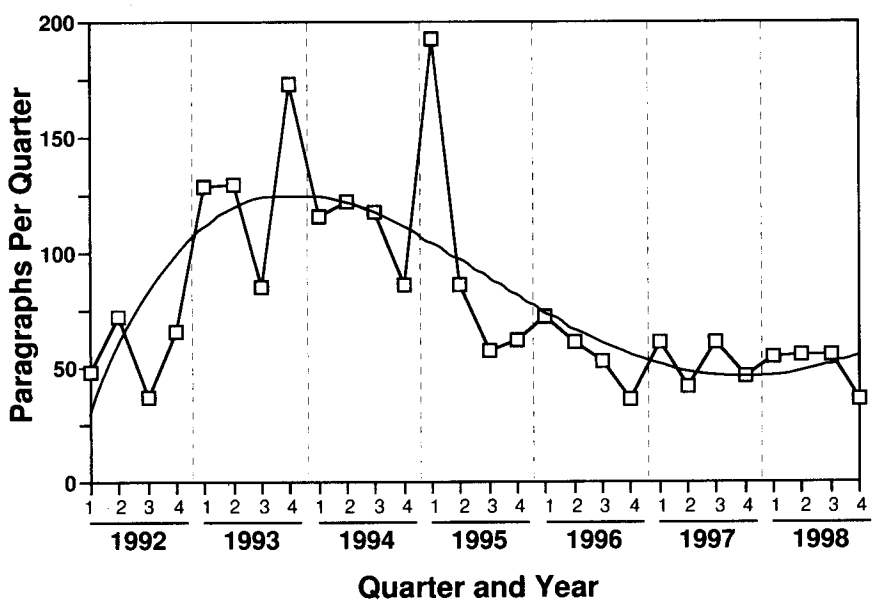

FIGURE 1 Total ecosystem management paragraphs in our database of news media text, 1992 through 1998 (plotted quarterly).

Significant events during the rise of this issue in the early 1990s included Forest Service Chief Dale Robertson announcing that ecosystem management would be the official policy of the Forest Service in June 1992 (Robertson 1992) and Interior Secretary Bruce Babbitt's championing ecosystem management during 1993. President Clinton's "Forest Conference" (held on 2 April 1993), the report of the Forest Ecosystem Management Assessment Team (FEMAT 1993), and ensuing controversy over the recommendations of the FEMAT report (Walker and Daniels 1996) helped keep public discussion of ecosystem management at a high level during 1993 and 1994.

The volume of media discussion and debate about ecosystem management began to decline during 1994 and continued to fall in 1995 and 1996, except for a notable jump in the first quarter of 1995. This jump was due in part to a series of in-depth articles that appeared in *The Seattle Times* in March 1995, and controversy surrounding the Minnesota Department of Natural Resources decision to adopt ecosystem management, which generated a significant amount of discussion in the news media.

Media discussion of ecosystem management has leveled off in recent years, indicating that ecosystem management is no longer a "new" or controversial idea and it is therefore less newsworthy. This leveling off also indicates that the period of intense public debate at the national level is over.

It is interesting to compare the publication dates of survey research on ecosystem management (Table 1) to the issue attention cycle shown in Figure 1. All but one of the studies were carried out and published after ecosystem management had already risen to prominence. Surveys and polls generally appear late in the issue attention cycle because most issues are not surveyed until they become widely recognized as important. An example is the lack of surveys about the disease of AIDS until after the Centers for Disease Control had identified it as a sexually transmitted disease in 1982 (Fan 1993).

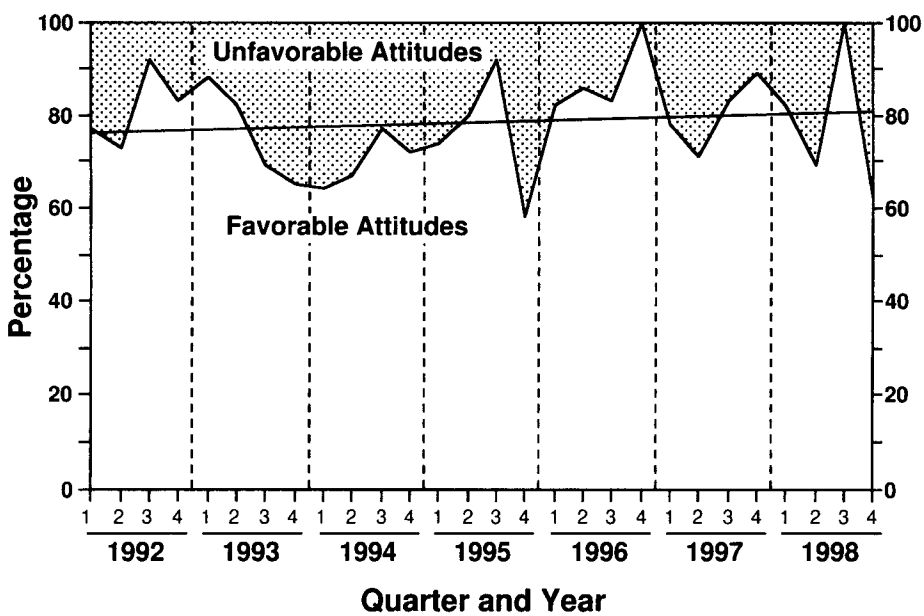

FIGURE 2 Percent of favorable and unfavorable attitudes toward ecosystem management expressed in the news media, 1992 through 1998 (plotted quarterly).

Figure 2 shows the percentage of favorable and unfavorable attitudes toward ecosystem management expressed in our database of news stories. At the national level, more than 78% of all attitudes have been favorable over the entire time period. The share of favorable and unfavorable attitudes ranged from 58% favorable (42% unfavorable) in the fourth quarter of 1995 to 100% favorable in the fourth quarter of 1996 and the third quarter of 1998. The regression line shown in Figure 2 indicates a slight upward trend in the share of favorable attitudes toward ecosystem management, but the slope of this line is not significantly different than zero.

The third quarter of 1993 through the first quarter of 1995 was a prolonged period with a higher than average share of unfavorable attitudes. This was the period of most active and intense social debate about ecosystem management, during which the volume of media discussion was highest and several high-profile events took place (e.g., Clinton's "Forest Conference" and conflict over the FEMAT report). Since early 1995, the share of unfavorable attitudes has fluctuated from quarter to quarter but there has not been another prolonged unfavorable period.

Discussion

Our finding of predominantly favorable attitudes toward ecosystem management expressed in news media stories (78% over the entire time period) is consistent with past research on attitudes toward ecosystem management. The studies summarized in Table 1 found generally favorable attitudes toward ecosystem management among the general public and highly favorable attitudes among nonindustrial private forest owners. But the previous studies—which used surveys and, in one case, focus groups to assess the public's attitudes—also found a high level of neutral attitudes or no opinion about ecosystem management that was not evident in news stories. Many people are either completely unaware of ecosystem management or don't know enough about it to hold a strong opinion. In news coverage, arguments in favor of and opposed to an issue are typically presented but one rarely finds expressions of neutral attitudes. Stakeholders interviewed by reporters generally have well-formed attitudes and beliefs about the particular issue, which may not be the case with the general public.

Our finding of mostly favorable attitudes is also consistent with research by Shindler et al. (1993), Hammond (1994), Steel et al. (1994), Bormann (1996), Xu and Bengston (1997), and Manning et al. (1999), who found evidence of strong support among the public for views consistent with ecosystem management (e.g., forest value systems in which ecological values are prominent, or support for management practices designed to maintain ecosystem integrity). Numerous nationwide surveys about the public's environmental concern and support for environmental protection have found evidence of a significant shift toward ecological values in recent decades (e.g., Kempton et al. 1995; Ladd and Bowman 1995; and studies cited therein). Environmental values are now mainstream societal values.

Several scholars have argued that the adoption of ecosystem management by natural resource management agencies is, at least in part, a response to changing social values and attitudes (Jones et al. 1995; Cortner and Moote 1999). Kennedy and Quigley (1998, 120) stated that: "Ecosystem management ... more closely honors complex, diverse, evolving and interrelated *ecosystems*—and is consistent with the democratic inclusion and public land values of an urban, post-industrial American society." The widespread adoption of ecosystem management by agencies is also a function of internal change (i.e., changing attitudes of agency employees) in interaction with public opinion and the views of other stakeholder groups. Brown and

Harris (2000) found that USDA Forest Service employees shifted toward embracing ecosystem management between 1990 and 1996.

The scope and nature of ecosystem management have evolved during the years covered by this analysis. During the 1990s, the prevailing conceptualization of ecosystem management has changed in response to social values, as noted by Brunson (1996b, 115): "As the concept [ecosystem management] has evolved, it has acquired a number of socially responsive trappings—e.g., a commitment to more substantive public participation earlier in the decision making process—which are clearly designed to meet public criticisms of forest management." The following news media quotes illustrate the increasingly common view that collaborative decision making is an integral part of ecosystem management:

> "The Ecosystem Management Task Force is a Department of Environmental Protection program that depends on citizen input to protect the environment and determine land use" ("Tampa and State; Neighborhoods," *St. Petersburg Times*, 7 March 1997, 8B).

> "This is precisely why a cornerstone to the DNR's ecosystem approach is active citizen involvement and interdisciplinary cooperation" ("Debating the future of the DNR," *Star Tribune*, Minneapolis, 20 December 1998, 11C).

Based on a qualitative examination of the stories in our database, the nature of the discussion about ecosystem management has shifted from a national, policy-level debate about its legitimacy and role in natural resource management to predominantly regional or local debates about its implementation. Instead of focusing on questions such as "what is ecosystem management?" and "should it be implemented?," media discussion has now shifted to how ecosystem management is being implemented or how it can best be put into practice in specific geographic areas. The view that ecosystem management is poorly defined or undefined was a frequently expressed unfavorable belief in the early 1990s, but this view is seldom expressed in recent years. These are indicators of growing acceptance and the changing nature of the social debate. The following quotations illustrate the growing acceptance of the concept but continued concern about or difficulty with implementation:

> "Many fishery and wildlife managers now accept the whole-ecosystem view in principle, but practicing it is a different matter" (Charles A. Radin, "The next wave," *Boston Globe* (magazine), 26 October 1997, 15).

> "Personally, I think that ecosystem management is an appropriate management policy, but the way it has been implemented has unnecessarily interrupted nearly a century of progressive forest management" (Doug MacWilliams, "What is happening to the Forest Service?," *Seattle Times*, 13 March 1997, B5).

The decline in the volume of discussion (Figure 1) and continued large share of favorable attitudes (Figure 2) in recent years may be due in part to the evolving conceptualization of ecosystem management in response to social values and goals—it is hard to find fault with an idea that is in tune with prevailing social attitudes, beliefs, and values.

Concluding Comments

Perhaps the most significant implication of our findings is to point to the need for explicit inclusion of the often powerful role of the news media in natural resource policy. Public acceptance of ecosystem management depends on how it is perceived and understood by the public. How ecosystem management is perceived by the public depends largely on how it is characterized in the news media because, as with most natural resource issues, the media are where most people get most of their information about it. This suggests a powerful role for the media in natural resource policy, a role that is often neglected. Many communications researchers have concluded that the media convey the overall climate of public opinion to policymakers. Kennamer's (1994, 7) media-centered model of political linkage—which places the news media as the central linkage between the public, policymakers, and special-interest groups—may be useful for natural resource policy analysts.

Analysis of attitudes toward ecosystem management using computer content analysis of the news media is a new way to monitor the social environment in which natural resource management must be carried out. The methodology used in this study could be used to create a new set of social indicators for ecosystem management that would complement indicators based on census data and other secondary sources, such as those proposed by Force and Machlis (1997). Unlike social indicators based on secondary data sources, indicators based on indirect measurement of public opinion as described in this study could track changes in general attitudes toward ecosystem management, attitudes toward key elements (e.g., adaptive management, collaborative approaches), specific beliefs (e.g., the view that ecosystem management is a threat to property rights), and underlying social values (cf. Xu and Bengston 1997). Such indicators could aid policymakers and natural resource managers in implementing ecosystem management, and could be (1) updated easily and quickly by downloading and analyzing recent news media text, (2) extended back in time in order to establish time trends, and (3) expanded to address additional or more detailed issues or concepts.

Our analysis found evidence that favorable characterizations of ecosystem management have been predominant and that ecosystem management may have become a "settled" (i.e., noncontroversial) issue with broad acceptance. Ecosystem management seems to be congruent with the ideal of collaborative decision making and with emerging public land values.

But the public asserts general values, such as the importance of a healthy environment or ecological and economic sustainability. The public points to the ends and does not think much about the means. While ecosystem management appears to enjoy broad public acceptance, policymakers, managers, and all interested stakeholders must continue to work out the many challenges and details of implementing ecosystem management. This is a daunting task, given the paradoxes of decision making, scale, and sustainability that characterize ecosystem management (Cortner and Moote 1999). The challenge is nothing less than to institutionalize ecological and economic interdependence democratically in order to secure a sustainable future.

Notes

1. A substantial body of research has examined the changing values and beliefs of USDA Forest Service employees and their attitudes toward ecosystem management. Brown and Harris (2000) includes a thorough and up-to-date review of this literature.

2. Downs (1972) proposed a model that describes the stages in the evolution of a social problem. He postulated that environmental concern passes through the following stages over

time: (1) preproblem, (2) alarmed discovery, (3) recognition of the cost of making progress, (4) decline of interest, and (5) postproblem.

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