

# How a “Bureaucratic Superstar” Implements Ecosystem Management: Lessons from the USDA Forest Service

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### Introduction

Ecosystem management is often proposed as a better approach than traditional management techniques for resolving today’s natural resource problems. Proponents of ecosystem management cite such examples as the “Dust Bowl”, desertification of the Southwest, and decline of marine fisheries to argue that traditional management cannot sustain natural resources in perpetuity. Therefore, they claim that long-term sustainability must become the ultimate goal of resource management (Christensen et al. 1996).

One of the many benefits of ecosystem management, according to its proponents, is the balance it strikes between preservation and utilization of resources. “The first priority is conserving ecological sustainability; levels of commodity and amenity outputs are adjusted to meet that goal” (Cortner & Moote 1999, p. 37). In addition, proponents argue that by being more holistic and by working with stakeholders and agencies, better resource management decisions are made. For example, they claim that natural resources do not exist in the absence of human impacts or values, and because ecosystem management integrates social and economic information along with scientific information, decision-makers have a clearer picture of goals and impacts of management and, therefore, can make better decisions.

Additionally, ecologists have long argued that nature does not exist in a static state, and is in fact rather chaotic. Proponents of ecosystem management argue that ecosystem management is better equipped than traditional management to deal with this because it is flexible and adaptive.

While much has been written about the benefits of an ecosystem approach, there is also mention of drawbacks. Fitzsimmons (1996) argues that the concepts that many use to define ecosystem management are unclear, and that it is impossible to understand what ecosystem management is when the concepts are “fuzzy.” Keiter (1995) asserts that the uncertainty surrounding how to define ecosystem management leads to uncertainty in how it is applied. Many authors agree, arguing that proponents of ecosystem management cite that the ultimate goal of ecosystem management is either ecological integrity or sustainability. Yet these proponents fail to agree what each means, how they are measured, how either can be attained, or whether they are in fact the same thing (see for example Fitzsimmons 1998).

Amid this debate, ecosystem management is being tried in a number of places, and challenges arise in implementing the changes that are involved. Cortner and Moote (1999) argue that traditional management is centralized, rigid, and organized in a bureaucratic top-down hierarchy. In contrast, ecosystem management requires decentralized, adaptive, flexible, cooperative management that is organized from the bottom-up (Yaffee 1996). The two techniques appear to be rather incongruent, so implementation of ecosystem management into the arena of traditional management may prove to be difficult.



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The first attempt at broad implementation of ecosystem management across multiple agencies came in 1993 when President Clinton presented his *Forest Plan for a Sustainable Environment*. Soon after, Vice-President Gore wrote a report initiating the process of adopting ecosystem management in other federal agencies that had not yet included it in their operations. The House and Senate also addressed ecosystem management at this time, through numerous briefings and hearings during the 103<sup>rd</sup> Congress. Senator Mark Hatfield, a Republican from Oregon, twice proposed legislation specifically to address ecosystem management, the Ecosystem Management Acts of 1994 and 1995. Both bills lacked sponsors other than Senator Hatfield and were sent to the Senate Energy and Natural Resources Committee, where they were given no consideration and died in subcommittee (see Lexis-Nexus Congressional Universe 1994 and 1995).

These unsuccessful attempts to enact legislation that calls for ecosystem management stand in contrast to agency initiatives that adopt ecosystem management. For example, in June of 1992, the Chief of the USDA Forest Service, Dale Robertson, announced that his agency would be moving to an "ecosystem approach" for the management of the National Forests. The Forest Service was the first agency in the world to officially declare adoption of an ecosystem approach to natural resource management. At the time, the popularity of ecosystem management was limited to scientific and resource management communities. It was being used by many federal agencies in pilot projects and showed some success "on-the-ground," in response to isolated, localized problems. It was not, however, thought of as a feasible federal initiative until the Forest Service got the ball rolling, so to speak.

The Forest Service is known for being a successful and effective agency, in fact Clark and McCool (1985) have described it as a "bureaucratic superstar." This highly adaptive agency was indeed ahead of the times when it made the decision to adopt an ecosystem management approach. However, policy adoption is not the same as policy implementation, and carrying out new practices on the ground can be exceedingly difficult. Given the complexities and institutional changes inherent in ecosystem management, it is important to examine the process by which it is implemented. Lessons learned from the experiences of the Forest Service may prove useful to agencies currently adopting an ecosystem management approach as well as those that may choose to do so in the future.

This study sought to answer the following questions: How has the Forest Service operationalized the ecosystem management approach in its policy directives? To what extent has the Forest Service attained its ecosystem management objectives to date? What factors affect the attainment of ecosystem management objectives? What sources of information do Forest Service employees consult in doing ecosystem management?



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## Research Methods

This study consisted of a multiple-method case study of the Forest Service. Due to the relative strength and flexibility of the Forest Service as compared to other agencies, it was thought that this agency might prove not only to be successful in implementing ecosystem management, but also useful in providing insight for other agencies attempting to adopt an ecosystem management approach. Additionally, because over eight years have passed since Chief Dale Roberstson announced the adoption of an ecosystem approach, the Forest Service might have benefited from having had the time to work through many of the obstacles that can hinder implementation.

Data were collected in a three-phase research design. Document analysis, survey, and interview techniques were used to measure and explain the relative success the Forest Service has had in attaining its ecosystem management objectives. As suggested by Sabatier and Mazmanian (1989), implementation success was operationalized according to the degree to which the Forest Service had achieved its ecosystem management objectives. This was measured on a rating scale according to Forest Service employees' perception of that success.

The first phase of research was descriptive and focused on analysis of government documents from the Forest Service and other government entities that have assessed the "on the ground" application of ecosystem management within the agency. Forest Service publications regarding the implementation of ecosystem management were assessed to discover the objectives it intended to meet through implementation. Additionally, reports from the Congressional Research Service and the Interagency Ecosystem Management Task Force have been analyzed for a broader understanding of agency objectives for the implementation of ecosystem management (see Morrissey et al., 1994 and IAEMTF, 1995). In addition, an interview with a high-ranking Forest Service official from the office of Ecosystem Management Coordination was conducted to further understand the objectives of the Forest Service in adopting an ecosystem management approach. Analysis of government documents and the interview informed the specific questions included in the survey, the next phase of the study.

The second phase involved a survey sent to 576 line authority employees of the Forest Service. This census of that population included 9 regional foresters, 109 forest supervisors, and 458 district rangers. The survey questions, informed by the document analysis and prior implementation studies, solicited information on the implementation of objectives by asking the employees to indicate their perceptions on a 0-4 rating scale. In addition, respondents were given the option to include their thoughts and comments regarding the study and ecosystem management. The survey followed the Total Design Method strategy (Salant & Dillman 1994) of a four-wave mail survey including a preliminary letter, a mailing of the survey, a follow-up reminder post card, and finally a second survey to non-respondents. Altogether 345 Forest Service employees responded to the survey, for an adjusted response rate of 60%<sup>1</sup>. Respondents included 4 regional foresters, 65 forest supervisors, and 276 district rangers. Overall, 25% of the respondents were women, and just over 33% identified themselves professionally with forestry. Other professional backgrounds included recreation, botany, wildlife, fish, hydrology, soil,



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ecology, and oil/gas/minerals, among others. (The wide array of professions is a feature of Forest Service work units, as a majority (54%) of line officers reported their work units employed at least six full-time specialists with non-silvicultural expertise listed above.)

The third phase of the study consisted of interviews with a small sub-sample of employees who responded to the mail survey. A total of 16 line officers were randomly selected and participated in an approximately 20-minute phone interview. Interviews led to a better understanding of the factors that have contributed to the Forest Service's success.

## Results

### Forest Service Ecosystem Management Policy

Several documents were analyzed in order to determine which specific objectives the Forest Service intends to meet in implementing ecosystem management<sup>2</sup>. This analysis reveals several themes in the Forest Service's ecosystem management policy objectives. These themes include an emphasis on sustainability, cooperation and collaboration with public and private entities, more efficient integration of science into management, adaptive management, improving partnerships between land managers and scientists, enhancing the protection of ecosystems, and restoring deteriorated ecosystems. While each of these themes was prevalent in some of the documents analyzed, not all of themes were found in every document, nor was there a specific listing of agreed upon objectives.

In an effort to clarify the list of objectives the Forest Service hoped to achieve, an interview was conducted with a high-ranking Forest Service official in the office of Ecosystem Management Coordination. The interviewee verified that no single policy document outlines what is to be accomplished by the Forest Service through ecosystem management. He said that there is a constant stream of information given to employees about ecosystem management, both from the Forest Service and outside sources. However, he also indicated that four primary objectives of ecosystem management are emphasized in the policy directives. The first is to increase collaborative stewardship, which refers to involvement by stakeholders outside of the agency. The second is the integration of multiple sources of scientific, economic, and social information. Adaptive management is the third objective, which refers to actively monitoring forest conditions for feedback and altering forest management actions based on that feedback. The last

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<sup>1</sup> Three surveys were returned unopened due to incorrect addresses, so the number of surveys assumed to have been received is adjusted to 573.

<sup>2</sup> The specific documents analyzed were the November 9, 2000 *Final Rule* promulgated by the USDA Forest Service regarding National Forest System Land and Resource Management Planning; the 2000 Revision of the *USDA Forest Service Strategic Plan*; the statement made by Chief F. Dale Robertson before a House subcommittee on June 16, 1992 concerning H.R. 1969, clear-cutting, and ecosystem management; *The USDA Forest Service Perspective on Ecosystem Management*, presented by Associate Chief David G. Unger at the Symposium on Ecosystem Management and Northeastern Area Association of State Foresters Meeting on July 18, 1994; and *Navigating Into the Future*, written by Chief Jack Ward Thomas based on decisions and recommendations made at a Forest Service Science and Policy Roundtable held in January 1994.





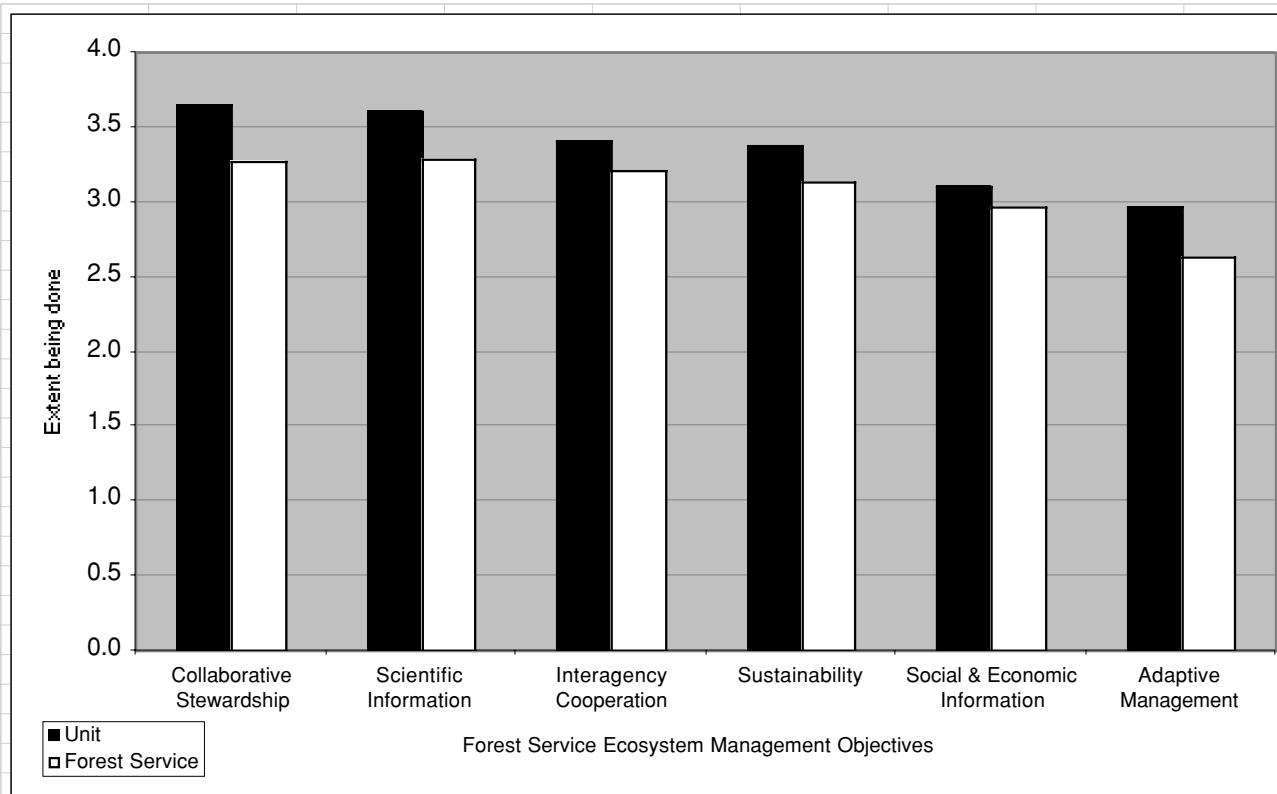
objective is increased interagency cooperation, where the Forest Service develops cooperative relationships with other agencies for forest management. Together with the Forest Service documents, from which the objective of sustainability is derived, a set of operationalized policy objectives emerges (see Table 1).

Objective	Operationalization
Collaborative stewardship	Making forest management decisions by working with people affected by and knowledgeable of the issues
Integrated scientific information sources	Integrating multiple scientific information sources in making forest management decisions
Integrated social and economic information sources	Integrating multiple social and economic information sources information sources in making forest management decisions
Adaptive management	Monitoring forest conditions for feedback and adjusting management based on that feedback
Interagency cooperation	Developing cooperative relationships with other agencies for forest management
Sustainability	Preserving ecological processes
Source: document analysis and interview data	

**Table 1:** Components of Forest Service ecosystem management policy

**Implementation Success**

In an effort to discover how successful the Forest Service has been in attaining its ecosystem management objectives to date, survey respondents were asked the extent to which their agency is meeting the six operationalized ecosystem management objectives. Respondents were asked to rate on a scale from 0-4 the extent to which these items are being done in the Forest Service as a whole, with zero representing “not at all,” two representing “somewhat,” and four representing “to a great extent.” Survey respondents were also asked to rate, on the same scale, the extent to which their specific work unit is doing those same six items. As shown in Figure 1, respondents on average rated all six items as falling between being “somewhat” done and done “to a great extent”, both by their unit and the Forest Service as a whole. This was consistent across all nine regions and the district, forest, and regional levels. Interestingly, on average, respondents rated their unit as doing all six items to a significantly greater extent than the Forest Service as a whole. Overall, Forest Service employees perceive that ecosystem management objectives are being largely attained.



Source: survey data

Note: 0 = not at all, 4 = to a great extent

**Figure 1:** Attainment of Forest Service ecosystem management objectives

Both within specific work units and across the Forest Service as a whole, statistical analysis reveals differences across the six objectives do exist in the extent that each is attained. This allows the objectives to be ranked meaningfully. As shown in Table 2, according to respondents' perceptions, work units are having the greatest success in attaining collaborative stewardship and the integration of scientific information sources; these objectives are tied for the first rank<sup>3</sup>. The work units are having slightly less success in attaining interagency cooperation and sustainability; these objectives are tied for third in their ranking. The objective ranked fifth is the integration of social and economic information sources and lastly, the objective the work units are attaining least is adaptive management.

<sup>3</sup> Wilcoxon signed rank tests were used to identify significantly different means at the 0.05 level. Items sharing the same rank number are not statistically distinguishable from each other.



Rank	Objective	Mean Score	Standard Deviation
1	Collaborative stewardship	3.65	0.58
1	Integration of scientific information	3.61	0.60
3	Interagency cooperation	3.41	0.76
3	Sustainability	3.37	0.71
5	Integration of social and economic information sources	3.10	0.82
6	Adaptive management	2.97	0.84

*Source: survey data Note: 0 = not at all, 4 = to a great extent*

**Table 2:** Respondents’ perception of attainment of ecosystem management objectives by work units

The same process was followed to establish a ranking for how respondents perceived that the Forest Service as a whole was attaining the six objectives. As is shown in Table 3, respondents felt that the Forest Service as a whole was having the most success in attaining the integration of scientific information sources, collaborative stewardship, and interagency cooperation. The lower ranked objectives are: sustainability, the integration of social and economic information sources, and adaptive management.

Rank	Objective	Mean Score	Standard Deviation
1	Integration of scientific information	3.29	0.75
1	Collaborative stewardship	3.27	0.76
1 <sup>a</sup>	Interagency cooperation	3.21	0.80
4	Sustainability	3.13	0.76
5	Integration of social and economic information sources	2.96	0.89
6	Adaptive management	2.63	0.92

*Source: survey data Note: 0 = not at all, 4 = to a great extent*

**Table 3 :** Respondents’ perception of attainment of ecosystem management objectives by the Forest Service as a whole

<sup>a</sup> Because the integration of scientific information is statistically indistinguishable from collaborative stewardship, and collaborative stewardship from interagency cooperation, all three objectives are given the first ranking. It should be noted, however, that the integration of scientific information and interagency cooperation are statistically different from each other.



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Both the Forest Service as a whole and the work units have had the greatest success attaining the objectives of collaborative stewardship and integration of scientific information sources. As indicated by one Forest Service official, the level of success achieved with collaborative stewardship can be attributed to the enactment of laws that required stakeholder involvement prior to the adoption of ecosystem management, for example the National Environmental Policy Act (NEPA). Therefore, seeking citizen input – a component of collaborative stewardship – was already part of forest management. In addition, several interview respondents noted that the Forest Service has always had to integrate scientific knowledge for the purposes of forest management, even in the past back when timber was more of a dominant focus. Consequently, integrating scientific information sources is a task in which the Forest Service is already experienced.

Adaptive management was the objective least attained both by the Forest Service as a whole and the work units. According to leading scholars in ecosystem management, adaptive management is very difficult to implement due to the significant changes it requires and the immense cost of monitoring. This challenge is borne out in practice, as one interviewee explained, “Adaptive management happens, but it is a reach for the agency. We don’t have all the mechanisms in place to do it well, and there are legal, logistical, contractual, and social constraints.”

Survey respondents also were asked to what extent certain factors theorized to affect policy implementation are present in the implementation of the Forest Service’s ecosystem management policy (see Mazmanian & Sabatier 1980). By averaging how respondents rated the presence of these factors across the six Forest Service ecosystem management objectives, the relative importance of each factor in affecting implementing ecosystem management can be evaluated.

Statistical analysis reveals differences among the 14 factors, which allows them to be ranked meaningfully. As shown in Table 4, respondents perceive the factor with the greatest presence is the feeling that ecosystem management ought to be done; this is ranked first. Other factors that respondents perceived to be present to a great extent are, tied for second rank<sup>4</sup>, understanding how these objectives are attained and having the decision-making authority to attain them. The factors that are ranked fourth and fifth are that ecosystem management is not a break from the Forest Service’s standard operating procedure and is not a break from the agency’s tradition, respectively. Tied for the sixth rank are the following variables: having clear and consistent guidelines, stakeholder involvement, training, changing social and economic conditions, involvement of the courts, and changing technological conditions. The three variables that were ranked as having the lowest presence are the existence of adequate funding, involvement of Congress, and the involvement of the White House.

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<sup>4</sup> Wilcoxon signed rank tests were used to identify significantly different means at the 0.05 level. Items sharing the same rank number are not statistically indistinguishable from each other.



Rank	Variable	Mean Score	Standard Deviation
1	Ought to be done	3.75	0.34
2	Understand	3.39	0.50
2	Decision-making	3.29	0.81
4	Not a break from SOP	3.11	0.86
5	Not a break from tradition	2.87	0.90
6	Clear guidelines	2.73	0.84
6	Opportunities for stakeholders	2.69	0.77
6	Training	2.66	0.78
6	Social & economic conditions	2.64	0.97
6	Courts	2.41	1.06
6 <sup>a</sup>	Technological conditions	2.40	0.83
12	Adequate funding	1.90	0.72
13	Congress	1.80	1.00
14	White House	1.58	1.06

*Source: survey data Note: 0 = not at all, 4 = to a great extent*

**Table 4:** Respondents’ perception of the presence of factors in implementation

Interview respondents confirmed these findings by attributing the Forest Service’s success in attaining its ecosystem management objectives largely to the commitment and work ethic of Forest Service personnel. They explained that employees join the agency because they have a profound love for the land and are committed to being good stewards. One respondent even said that there has been “100 % commitment from D.C. down to the specialists in the districts” in implementing ecosystem management. In addition interviewees described how important their decision-making authority is due to the multidisciplinary or holistic nature of ecosystem management, which calls for line officers to draw from the knowledge of a diverse workforce and input from a variety of publics when making forest management decisions.



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Interviewees reiterated that adequate funding was not provided for the attainment of the ecosystem management objectives, largely due to the manner in which the agency's funding is provided by Congress. Funding is provided by line item rather than as one integrated pool, which means when projects become more holistic and integrative in keeping with an ecosystem management approach, it is difficult to integrate funding to provide for them. Even so, respondents described how they can search out grants, partners, and volunteers to provide more monies and make the funding they are appropriated stretch further. In addition, respondents described how they have pooled funds, used timber money, or sold forest products to increase their financial resources for ecosystem management. One respondent noted, "It is really a matter of scale; we are doing a good job in the projects we select, but we are barely scratching the surface in ecosystem restoration. We could do so much more with better funding."

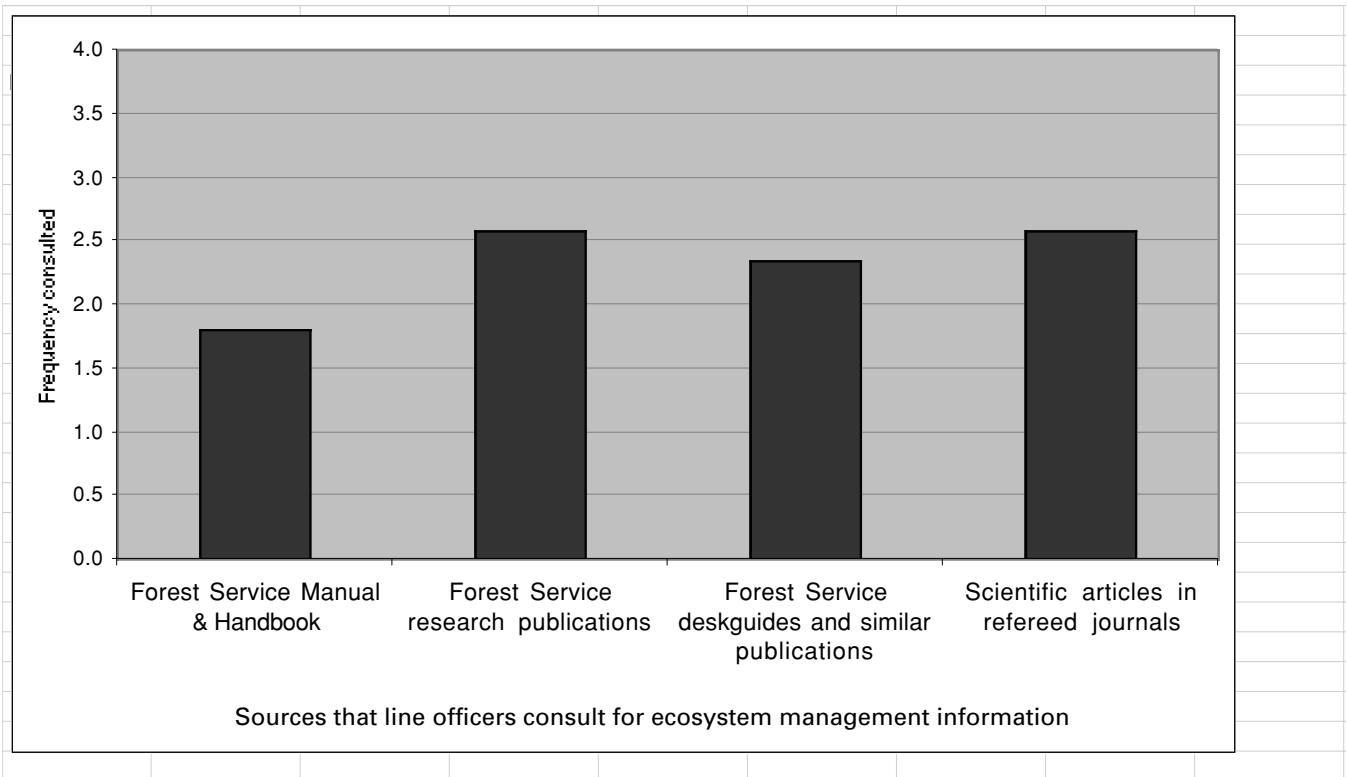
Interviews were also helpful in explaining why the involvement of Congress and White House were ranked low. While respondents felt that the White House and Congress have an impact through the overall direction the agency takes and funding, their effect is more indirect as compared to the other factors mentioned. One interviewee described how the overall direction of the White House changes with each administration, as does the funding from Congress when power is shifted between the parties, but in general these do not directly affect the implementation of ecosystem management objectives on the ground.

### Sources of Information

Given the predominant role of agency personnel understanding and support of ecosystem management in successful implementation, it is important to examine where line officers obtain the information and guidance to follow an ecosystem management approach. Respondents were asked to rate, on a scale from 0-4, the frequency with which they consult various information sources to obtain information and guidance on ecosystem management, with zero representing "never," two representing "sometimes," and four representing "often." As is shown in Figure 2, respondents on average consult each of the sources of information only sometimes, with the *Forest Service Manual* and *Handbook* being consulted less often than the others. The sources most often consulted are Forest Service research publications and scientific articles in refereed journals, but they are not, on average, consulted often.

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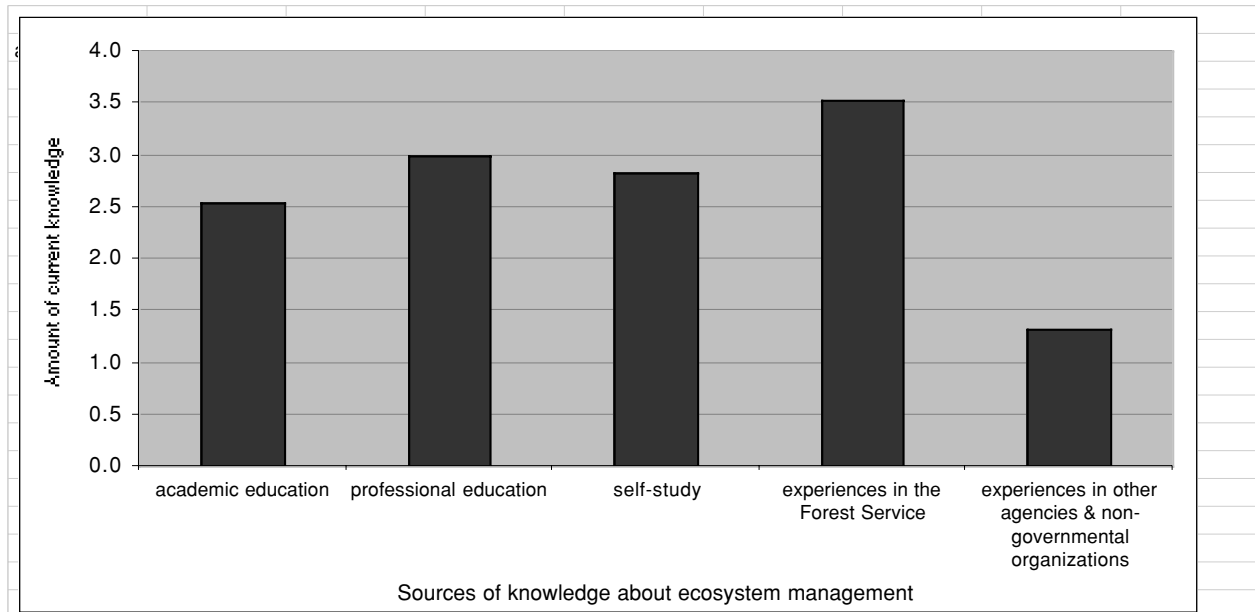
<sup>a</sup> The extent that court involvement affects attaining objectives is statistically indistinguishable from the extent changing technological conditions affects attainment, so they were given the same rank. It should be noted, however, that the variable changing technological conditions is statistically different from the other variables given the rank of 6.



Source: survey data  
Note: 0 = never, 4 = often

**Figure 2:** How often information sources are consulted by Forest Service line officers for ecosystem management

In an effort to understand where line officers have obtained their current knowledge about ecosystem management, respondents were asked about various sources. They were asked to rate, on a scale from 0-4, how much of their current knowledge has come from a variety of sources, with zero representing “none,” two representing “some,” and four representing “a lot.” On average respondents indicated that a great deal of their current knowledge came from their experiences in the Forest Service, with at least some of their current knowledge coming from their academic education, their professional education, and self-study. Respondents on average received very little of their knowledge about ecosystem management from experiences in other governmental agencies or in non-governmental organizations.



Source: survey data  
Note: 0 = none, 4 = a lot

**Figure 3:** Where current knowledge about ecosystem management was obtained

In sum, personnel rely on experiences in the Forest Service to inform their understanding of ecosystem management. For guidance on implementing ecosystem management in their agency, they tend to rely on Forest Service research publications and scientific articles in refereed journals.

## Conclusions and Recommendations

In keeping with its tradition of being a strong and effective agency, the Forest Service has been quite successful in implementing its ecosystem management policy. Forest Service line officers throughout the National Forest System feel that all six ecosystem management objectives (collaborative stewardship, integrated scientific information, integrated social and economic information, adaptive management, interagency cooperation, and sustainability) are being largely attained. This suggests that the Forest Service has created an ecosystem management policy that can be practically and successfully applied.





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The Forest Service has earned a reputation of being a “bureaucratic superstar” because it has proved itself to be an agency that can successfully adapt to the changing views of the public and maintain its effectiveness. Bearing that in mind, this study’s results might contribute to the agency’s ability to maintain or improve its success in implementing ecosystem management. In addition, other agencies implementing an ecosystem management approach may benefit from the Forest Service’s experience. The components of ecosystem management that the Forest Service has had difficulties with will likely present hurdles for other agencies, just as the factors that have aided the Forest Service in the attainment of ecosystem management could prove helpful to other agencies attempting to implement this new approach.

Survey and interview data suggest that the knowledge and commitment of agency employees has been valuable in achieving this success. It is reasonable that Forest Service leadership should, therefore, make an effort to maintain or improve the current level of employee commitment and understanding. Rewarding the attainment of ecosystem management objectives might sustain and increase commitment. In addition, augmenting the *Forest Service Manual* and *Handbook* as sources for information about ecosystem management implementation might improve understanding further still.

The agency has had the most success in achieving the collaborative stewardship and integrating scientific information objectives. This is likely due to previous experience line authority personnel have had with both of them. In contrast, line officers indicated they have had more difficulty in attaining the ecosystem management objectives for which they lack experience, specifically adaptive management and integrating social and economic information. Natural resource managers are most often trained in the natural sciences, and often have more experience in the integration of scientific, rather than socio-economic, information. Additional effort to generate understanding of the social and economic aspects of natural resource management, and to transmit this understanding to practitioners, could play a vital role in improving the success of implementing ecosystem management. It is not surprising that line officers also indicated difficulty in carrying out adaptive management, because they often lack both the experience and funding required to monitor and adjust management in the field. Therefore, better understanding and more experience with adaptive management could be beneficial to implementation.

Survey and interview results suggest that funding for ecosystem management is neither appropriately distributed nor fully adequate. It would be beneficial to ecosystem management implementation if agency leadership were able to convince Congress that funding would be more useful if it was integrated and provided specifically for ecosystem management, even if overall funding could not be increased.

Whether or not ecosystem management is indeed a better management technique for maintaining natural resources remains to be seen. The Forest Service’s experience, however, has shown that the concept of ecosystem management can be practically expressed as agency policy and meaningfully applied “on the ground.”



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## About the ECARP (Environmental Communication, Analysis, and Research for Policy) Working Group

Located within the School of Natural Resources, the ECARP (Environmental Communication, Analysis, and Research for Policy) Working Group is a vibrant and multi-disciplinary research, development, and consultation center staffed by a core group of affiliated faculty members and graduate research associates representing the social, management, and natural sciences. In addition to a core of faculty leaders, ECARP serves as a clearing-house, tailored to particular projects, by gathering research and support personnel from across the campus and nation as needed.

### The ECARP has five fundamental objectives:

1. To apply technical knowledge and analytical methods to key environmental and natural resource questions identified by clients such as Federal, State, and local management agencies and private entities.
2. To advance the state of knowledge and disseminate findings for concepts and methods concerned with environmental and natural resource issues.
3. To conduct innovative and valuable research that helps frame thinking and debate about environmental and natural resource issues.
4. To recruit top-quality graduate students to the School of Natural Resources and provide students with opportunities to work with faculty on projects within the ECARP Working Group.
5. To serve as a focus for student and faculty research by applying for and securing research funding from Federal, State, University, non-governmental, and other sources.



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Some examples of the types of research and client-based projects the ECARP might undertake include the research and development of:

- policy analysis tools to gauge the effects of policy instruments on target populations and the environment
- stakeholder collaboration and citizen participation processes in natural resources policy
- structured environmental decision making approaches
- cutting edge research in the natural sciences to inform environmental policy choices
- comprehensive environmental risk communication approaches
- innovative environmental education and interpretive efforts
- courses to be offered in the School of Natural Resources for students as well as the community of environmental professionals

### **For More Information**

More information is available at the ECARP website: <http://ecarp.osu.edu>

As part of its effort to develop and disseminate knowledge, ECARP publishes analytical reports related to environmental and natural resource issues. These reports are available through the ECARP website.





