

CONCLUDING PERSPECTIVES ON ECOSYSTEM MANAGEMENT IN INTERIOR FORESTS

Edward J. DePuit

This symposium has been replete with information, insights, interchange of ideas, and meaningful interaction on perhaps the most significant evolution in natural resource management in recent time—the concept of ecosystem management. To review what we have covered, the symposium began with an introduction to ecosystem management by the Forest Service, followed by perspectives from conservationist, industry, and scientific sectors. Various principles of ecosystem management were subsequently introduced and discussed from ecological, socio-economic, and legal standpoints. Following this, speakers reviewed the status of assessments of interior northwest ecosystems and their components and values, and the symposium concluded with a discussion of strategies that may help to resolve major ecosystem management issues. I believe the fundamental messages from these sessions are that the principles of ecosystem management must be developed and applied:

- to squarely address *all* issues surrounding the values of ecosystems and their sustainability, and
- that perspectives of *all stakeholders* on such issues must be recognized for ecosystem management to have a reasonable chance of successful implementation.

How might we concisely sum up the principles of ecosystem management—a subject upon which we have learned much this week; upon which much has been written and stated in recent years; but upon which considerable public and professional uncertainty nonetheless remains. A recent report by a team at the University of Arizona (Moote, Burke, Cortner and Wallace, 1994) provided a very insightful synthesis of such principles. These researchers concluded that ecosystem management, in essence, is a management *philosophy* that:

- focus upon ranges of conditions and trends rather than outputs from natural ecosystems, and
- that strives to protect or restore those ecological components, structures, and processes that are essential for sustainability of ecosystems and all options from ecosystems in perpetuity.

The Arizona team went on to distill available information into five general principles of ecosystem management. With some personal paraphrasing and amplification, these five principles are presented in the following paragraphs as a means of drawing together the things we have heard this week.

First, is the principle of *socially defined goals and management objectives*. We must not forget that the goals and objectives

of ecosystem management (indeed, of any type of resource management) are ultimately set by society. There certainly is an intuitive need for society to properly base its needs, expectations, and activities upon scientific principles (i.e., upon the ecological characteristics and limits/capabilities of ecosystems). Nonetheless, the fundamental principle is that ecosystem management, if accepted and implemented, will be no different than any other land management paradigm in being a socially-driven process. In other words, the goals of ecosystem or other management strategies are manifestations of social values, irrespective of whether such values/goals involve unfettered operation of natural processes, production of goods, or some combination thereof. Scientific knowledge does not set these goals; it merely “tempers” them.

The second ecosystem management principle relates to the need for *collaborative decision making (and mutual learning)*. Recognizing that ecosystem management goals, again, are socially defined, it becomes essential in planning to define, to appreciate and, if possible, to reconcile the often differing needs, desires, and mandates that exist among all stakeholders in the ecosystem. To do this effectively, there are needs during the *planning* process for:

- open communication,
- mutual understanding and (if possible) consensus and respect among differing perspectives, and,
- (very importantly) active cooperation among all constituencies with interests in the ecosystem.

I would like to extend these points to include, in many cases, the need for direct involvement and collaboration among varied local stakeholders during the *implementation* of ecosystem management practices.

The third ecosystem management principle relates to the need for *integrated, holistic science*. What this principle means is that:

- ecosystem management focuses upon the entire functioning system rather than upon discrete system components or outputs—thus creating more complex than more singularly focused management paradigms;
- ecosystem management also recognizes the changing nature of ecosystems—thus becoming more dynamically oriented than static;
- ecosystem management focuses upon interrelationships among ecosystem processes and components rather than addressing these things in isolation;

- and last, but very importantly, ecosystem management recognizes human beings as integral components of ecosystems—which brings to bear the necessity of integrating ecological sciences with social, political, and economic sciences when striving to properly manage ecosystems.

The fourth principle of ecosystem management relates to *broad spatial and temporal scales*. Past management paradigms have often focused upon relatively “localized” systems over relatively short periods of time—such as particular forest stands managed over single rotations. Spatial and temporal breadth is amplified greatly under ecosystem management. Management is targeted to entire ecosystems and, sometimes, collections of ecosystems over periods of time sufficient to account for fuller expression of natural developmental processes. In short, ecosystem management involves landscape/watershed-level spatial scales and long-term temporal scales that are defined by ecological and social processes. Implicit within this principle is the fact that ecosystem management often must extend across political, ownership, and generational boundaries—and this, of course, makes ecosystem management much more difficult than past management scenarios.

The fifth and final general principle of ecosystem management, as generated by the Arizona team, relates to the need for *institutional adaptability*. As any “honest” scientist, land manager, or stakeholder should acknowledge, there is a great deal we simple do not yet know about the function of ecosystems and about their management to meet society’s desires. Although our body of ecologic, social, and economic knowledge will increase over time, some degree of ignorance will always exist regarding entities as complex as natural ecosystems in interaction with human society. Thus, ecosystem management certainly is now, and probably will remain for some time, a largely experimental management paradigm. Because of this, organizations, laws, policies, and management practices need to be flexible enough to allow adaptation to new information and altered ecological, socioeconomic, or political conditions. Whether they be government agencies, private industry, public interest groups, or other entities, institutions must be structured (or *restructured*) as necessary and feasible:

- to allow management planning to go forward despite *acceptable levels of uncertainty* (although the key question here is what comprises “acceptable” uncertainty);
- to provide for *adaptive management* that allows changes in practices in light of new knowledge or initial failures; and
- to recognize that management will be as much a *learning* as a goal-oriented process.

I do believe these five general principles have been supported, in various fashions, by our speakers this week, and that they therefore are appropriate for us to ponder as we conclude this symposium. If we assume that the principles (again) of:

1. socially defined goals,
2. collaborative decision making,
3. integrated, holistic science,

4. broad spatial/temporal scales, and
5. institutional adaptability

are at least partially valid, the salient questions with ecosystem management become how to *apply* these principles as resource managers. Tentative answers to such questions are beginning to be developed for interior western forests, as we have heard this week and as have been recently synthesized elsewhere (e.g., Jensen and Bourgeron, 1994). For example, an analytical system for implementing ecosystem management was recently proposed by Oliver et al. (1994), and a general planning model has very recently been drafted for interior northwest ecosystems by the Eastside Ecosystem Management Project (Science Integration Team, 1994). The latter model, while still preliminary, consists of four iterative steps: biophysical/social assessments; decision-making; implementation of decisions/practices; and monitoring to determine effectiveness of implementation and to generate feedback for subsequent re-assessments and reiterations of the planning process.

The effectiveness of these and other schemes for application of ecosystem management remains to be demonstrated through field application, however, and such field applications using experimental learning/adaptive management principles will comprise a major challenge for resource managers in coming years. Many of the resource managers who will be called upon to meet these challenges will have been educated and gained prior experience in relatively narrow fields, and (as a normal consequence of varied backgrounds) will possess differing value systems/philosophies. For example, ecologists such as myself will have a natural tendency to approach ecosystem management primarily from the standpoint of “*their*” discipline and philosophy, despite such warnings as that of R. D. Pfister (himself an ecologist) who wrote in 1993 that “*The best ecological approaches cannot sustain ecosystems unless they are integrated into a human context*”. In light of this, I would urge managers to remember the necessities of disciplinary integration and collaborative learning/decision-making that are implicit in ecosystem management. The need for such holism was succinctly stated by Sample et al. (1993):

“...[A]n ecosystem approach must be not only ecologically sound but also economically viable and socially responsible — if it is lacking in any one of these three areas, the system will collapse...”

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Author

Edward J. DePuit, Chair
 Department of Natural Resource Sciences
 Washington State University
 Pullman, WA 99164-6410