



Figure 1. Ecosystem management calls for collaborative decision making and adaptive management to deal with the problems presented by fragmented landscapes.

Ecosystem management: Political challenges for managers and scientists

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Traditional resource management grew out of the conservation movement at the turn of the 20th century. That movement created professional, scientifically-based resource management disciplines and agencies such as the National Park Service dedicated to reversing the previous century's practices of resource abuse and waste. But over time the laudable conservationist concept of sustained yield became institutionalized as a politics of maximum sustained yield. Policy and agency budgets came to stress commodity production and outputs, whether timber in case of the U.S. Forest Service or visitor services (e.g., roads and parking areas, trails, visitor centers) in terms of the National Park Service. The "use and enjoy" side of the National Park Service's 1916 mandate gradually overshadowed its resource preservation side. While the environmental decade of the 1970s witnessed legislation such as NEPA (National Environmental Policy Act) that provided more public access to agency decision making, strong, competing national interest groups dominated the policy debate. That debate became increasingly polarized, full of acrimony, and absent civility, as exemplified by protracted battles over spotted owls and future plans for Yellowstone and Yosemite. Moreover, managers clung to an outmoded professional ethos that fundamental allocation decisions regarding resources should be entrusted to experts, i.e., themselves. This created a per-

ception of aloof and elitist bureaucrats that further separated managers and the public.

Admittedly, the conservation movement of the 20th century can claim many significant accomplishments. Nevertheless, in the face of changes in social values, technology, demographics, and scientific knowledge, the governance framework that evolved out of that movement does not currently fare well under critical assessment. It is increasingly being recognized as not sufficient for achieving either ecological or democratic sustainability. Thus, ecosystem management, which is organized around the concept of long-term ecological sustainability, is being proposed and applied as an alternative. Our research (*The Politics of Ecosystem Management*, Island Press, 1999) examines the patterns of politics that gave rise to the call for ecosystem management, the criticisms it faces, and the political challenges that successful implementation of such an alternative will necessarily entail.

A paradigm shift?

The principles and ideals of ecosystem management differ so much from traditional resource management that several observers have called ecosystem management a paradigm shift, i.e., a revolution in the ideas, values, assumptions, and methodologies that guide scientific inquiry and management practice. Unlike traditional management, ecosystem management does not begin with enumerating outputs; in ecosystem management objectives are related

first and foremost to the condition of the ecosystem. Ecosystem management makes ecological sustainability—long-term maintenance of ecosystem productivity and resilience—a primary goal. Levels of use are adjusted to meet that goal. Protection and restoration of ecosystem structures and processes, particularly biodiversity, is paramount. Ecosystem management further recognizes a critical interdependence between social and ecological vitality and includes humans and human societies in resource management to an unprecedented extent. It breaks new ground by insisting that the social and political basis of natural resource management goals be made explicit and by encouraging their development through an inclusive and collaborative decision-making process (figure 1). Ecosystem management is based on an ecosystem science that integrates many disciplinary approaches. Given the recognized complexity and dynamic nature of ecological and social systems, ecosystem management embraces the concept of adaptive management, which requires constant reassessment and revision as new information becomes available.

While the principles of ecosystem management certainly imply a dramatic shift from the patterns of politics that came to characterize much of natural resource management, it is nonetheless premature to declare ecosystem management the new paradigm. First, ecosystem management faces strong and wide-ranging criticisms from both sides of the political spectrum.

Critics say that it is fuzzy, ambiguous, and untested, politically and legally untenable, full of contradictions, an effort by resource experts to recapture the ground they have lost since extensive public participation was institutionalized in the 1970s, a plot to turn all public land into nature preserves and parks, and a threat to private property rights. Second, while substantial information has been accumulated regarding ecological processes and the political dysfunction of the traditional paradigm, the values, theories, methodologies, and tools of the old paradigm have not yet been fully discarded. Maximum sustained yield and "expert" decision making by resource managers are still the norm in many cases. Agencies remain wedded to traditional public involvement programs that feature one-way communication and focus more on meeting legal thresholds and gaining support for proposed agency plans than on meaningful public deliberation. Utilitarian human-use values and demands continue to trump efforts to preserve park resources and protect biodiversity. Major decision-making entities such as Congress remain committed to the traditional paradigm. The politics of interest still dominates.

Clearly there are a number of major philosophical and institutional hurdles to be addressed and overcome before ecosystem management can be fully accepted and implemented as a new paradigm. Profound changes in the American governance system in its philosophy, institutions, notions of citizenship, politics, and resource management practices will be necessary. These changes range from redefinition of the values defining relationships among humans and nature and between citizens and government, to creation, reform, or even dismantling of traditional resource management institutions. This will entail, at a minimum, reexamining laws and policies, rethinking property rights (both public and private), changing administrative organizations, aligning market operations with the goal of sustainability, and building social capital for more effective public engagement. Changes by all players in all institutions will be necessary. If resource professionals, for example, are unwilling or unable to withstand a radical revision of their own values, management practices, and institutional structures, a paradigm shift seems unlikely. Instead the rhetoric of ecosystem management will be applied without any meaningful shift in management

attitudes and practices and lasting results on-the-ground. National Park Service managers will therefore need to reexamine management practices and standard operating procedures to ensure that they promote behaviors that advance the principles of ecosystem management, learn to share power with a variety of community groups and sister agencies, more actively engage citizens in park decision making, and align budget priorities to achieve the ecosystem management goals. Likewise, park scientists will need to embrace changes in the institution of science.

Changes in the institution of science

Changes in scientific inquiry will mean new methods, new research questions, and new roles for park scientists and managers. Innovative ways to provide more avenues for direct public participation in the scientific enterprise will need to be developed. Adaptive management will require greater use of lay people and volunteers to assist with monitoring, analysis, and evaluation. Such a "civic science" will encourage citizens to serve as lay scientists and managers. This will also require science to make a renewed commitment to providing policy-relevant information as society makes the social and ethical decisions that shape sustainability. Park Service scientists and managers, for example, will need to learn new ways of working with the public (including park visitors and nearby communities) in the process of developing and interpreting scientific data and analysis (figure 2). Science, therefore, will be used to inform a more public and fully deliberative decision-making process.

Ecosystem management will also require scientists to address more effectively the split between the social and natural sciences. Because ecosystem management stresses the importance of humans in the ecosystem and socially derived goals and objectives, park science will need to reflect a larger social science role. Park social science will need to focus both on issues internal and external to the parks, determining, for example, how visitors relate to park resources and services, how management decisions affect, and are affected by, social, economic, and political conditions in surrounding communities, and how incentives can be devised and barriers removed for managing across ownership boundaries. Monitoring will include social analysis and evaluation of lessons learned



Figure 2. Visitor education programs will have expanded roles in ecosystem management.

through experimentation with new institutional arrangements and policy tools.

Organizational change

The importance of organizational change, especially in how resource agencies relate to one another and the public, is crucial to adoption of an ecosystem approach. Ecosystem management means management across ecological, political, generational, and ownership boundaries. Defining management units ecologically rather than politically will require recognition of the mutual responsibility for ecosystem processes that transcend conventional boundaries and coordination to an unprecedented degree (figure 3, next page). The greater Yellowstone ecosystem is perhaps the most frequently cited example of a complex set of multiple resource problems originating from a system that divides ecological processes into distinct units for management by multiple entities. But in countless other park areas, new institutional arrangements and collaborative processes will also be necessary to manage park problems originating from other jurisdictions. Such problems, for example, range from the urban and commercial development pressures on nearby lands that is affecting Saguaro National Park, Blue Ridge Parkway, and Gettysburg National Military Park, to the air pollution from distant sources that is imperiling Mount Rainier, Grand Canyon, and Big Bend Na-

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Figure 3. When management units are defined ecologically rather than by arbitrary political boundaries, greater coordination will be required to deal with the realities and impacts of different ownership objectives.

tional Parks. While working from an ecosystem management perspective may certainly mean more Park Service input into management of lands adjacent to its units, it may also mean less agency control over management and science within park boundaries. Consequently, similar organizational adjustments will be required to enable Park Service personnel to more effectively explore with adjacent communities and interested stakeholders off-park problems arising from proposed changes in park operation, such as road and campground closures, species reintroduction, or the use of fire.

Bureaucratic efforts to protect agency domains, however, have long been recognized as one of the impediments to effective coordination. Turf battles persist among agencies and different levels of government; specialists in one agency lack trust in similar specialists in another. Cultural barriers divide managers and scientists. Even within agencies there may be competition among specialists or different parts of the agency; better external coordination can occur only when there is better internal coordination. Coordination is both a process and a structure of relationships that distributes power, access, and resources.

The recent upsurge in the formation of a number of collaborative, community-based conservation and watershed groups is an

encouraging sign. These groups present one means of addressing both environmental concerns for ecological sustainability and democratic concerns for justice and economic equity. Citizens involved in collaborative efforts, however, often cite bureaucratic barriers such as agency inertia, administrative red tape, lack of inter-agency coordination, jurisdictional conflicts, and "reactionary policies" as impediments to their efforts to work collaboratively with agencies. Moreover, agency personnel at the local level who want to be involved in community processes frequently find that they lack support from administrative superiors. The Park Service has been involved

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in a number of large-scale, ecosystem efforts at the regional level, e.g., Everglades and Yellowstone, as well as in several community-based efforts. More needs to be done, however, and much more needs to be learned about how to make the agency more effective participants in such collaborative groups. In this regard, allocating time and dollars for developing and fostering relationships with communities outside park boundaries will need to be recognized as just as important as administrative work inside park boundaries.

For change to occur, agency incentives and rewards systems will need to be adjusted to ensure that they encourage and reward behaviors consistent with an ecosystem approach. National Park Service managers will need to ensure that agency culture fosters a spirit of cooperation and a willingness to share power with other agencies, nongovernmental organizations, and private citizens. Social science that focuses on the processes and consequences of organizational change can assist park managers in revamping their units to create a learning organization that operates in an adaptive management mode.

Conclusion

Ecosystem management is not just about science—more science, better science, needed science. It is also about politics and political choices; new patterns of politics will be required. Political choice will determine how ecosystem management evolves in the future—whether it creates new and viable patterns of politics to supplant traditional modes and how it progresses toward the goal of long-term ecological sustainability. Neither Park Service managers nor scientists can thus afford to ignore the political nature of ecosystem management. The political challenges of ecosystem management must be recognized and confronted if ecosystem management is to move beyond theory and the noteworthy, but limited, applications made to date. In meeting these political challenges park science—including social science disciplines working in concert with other scientific disciplines, park managers, and the public—has a significant role to play. **P₃**

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