Ecosystem management (EM) is a concept that has germinated since the last decades of the twentieth century and continues to increase in popularity across the United States and Canada. It is a concept that eludes one concise definition, however, because it embodies different meanings in different contexts and for different people and organizations. This can be witnessed by the multiple variations on its title (e.g., ecosystem-based management or collaborative ecosystem management). The definitions that have been given for EM, though varied, fall into two distinct groups. One group emphasizes long-term ecosystem integrity, while the other group emphasizes an intention to address all concerns equally, be they economic, ecological, political or social, by actively engaging and incorporating the multitude of stakeholders (literally, those who hold a stake in the issue) into the decision-making process.

One usable though incomplete definition of EM is provided by R. Edward Grumbine, former director of the Sierra Institute (undergraduate program in wilderness and cultural field studies): "Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term." Ultimately, EM is a new way to make decisions about how we humans should live with each other and with the environment that supports us. And, it is best defined not only by articulating an ideal description of its contents, as Grumbine has done, but also through a rigorous
EM--A new management style

Between the years 1992 and 1994, each of the four predominant federal land management agencies in the United States—the National Park Service, the Bureau of Land Management, the Forest Service and the Fish and Wildlife Service—implemented EM as their operative management paradigm. Combined, these four agencies control 97 percent of the 650 million federally-owned acres (267 million ha) in the United States, or roughly 30 percent of the United States' entire land area. EM has become the primary management style for these agencies because it became apparent in the 1980s and 1990s that the traditional resource-management style did not work. It was largely ineffective in addressing the loss and fragmentation of wild areas, the increasing number of threatened or endangered species, and the increased occurrence of environmental disputes. This ineffectiveness has been attributed to the traditional management style's main focus being on species with economic value, its exclusion of the public from the decision-making process, and its reliance on outdated ecological beliefs. This explicit acknowledgment that the traditional management style is inadequate has coalesced within state and federal agencies, academia, and environmental organizations, and has been bolstered by advances in other relevant fields, such as ecology and conflict management.

Break the traditional management style into individual component shows that each ineffective attribute has a new or altered counterpart in EM. One of the best ways to describe what EM actually entails is to explicate this juxtaposition between traditional and new management styles.

EM, as its name makes clear, concentrates on managing at the scale of an ecosystem. Alternately, traditional resource management has focused only on one or a handful of species, especially those species that have a utilitarian, or more specifically economic, value. For example, the U.S. Forest Service has traditionally managed the national forests so as to produce a sustained yield of timber. This management style is often harmful to species other than timber and can have negative effects on the entire ecosystem. In EM, all significant biotic and abiotic components of the ecosystem, as well as aspects such as economic factors, are, ideally, reviewed, and the important ecological data incorporated into the decision-making process. A review of a forest ecosystem may include an analysis of habitat for significant song birds, a description of the requirements needed to maintain a healthy black bear (Ursus americanus) population, and a discussion of acceptable levels of timber production.

A major problem associated with using an ecosystem to define a management area is that boundaries of jurisdictional authority, or political boundaries, rarely follow ecological ones. This implies that by following political boundaries alone, ecological components may be left out of the management plan, so one may be forced to manage only part of an ecosystem, that part which is within one's political jurisdiction. For example, the Greater Yellowstone Ecosystem goes far beyond the boundaries of Yellowstone National Park. Therefore, a large scale EM project for Yellowstone would require crossing several political boundaries (e.g., national park lands and national forest lands), which is a difficult task because it entails several political jurisdictions and political entities (e.g., state and federal agencies, and county governments).
EM projects address this obstacle by forming decision teams that include, among others, representatives from all of the relevant jurisdictions. These decision-making bodies can either act as advisory committees without decision-making authority, or they can attempt to become vested with the power to make decisions. This collaborative process involves all of the stakeholders, whether that stakeholder is a logging company interested in timber production or a private citizen concerned with water quality. Such collaboration diverges from the traditional resource-management method, which made most decisions without public awareness, asking for and receiving little public input. These agencies traditionally shied away from actively engaging the public because it is less complicated and faster to make decisions on one’s own than to ask for input from many sources. There has often been an antagonistic and distrustful relationship between state and federal agencies and the public, and there has been little institutional support (i.e., within the structure of the agency itself) encouraging the manager in the field to invite the public into the decision-making process.

EM's more collaborative and inclusive decision-making style ideally fosters a wiser and more effective decision. This happens because as the decision team works toward consensus, personal relationships are established, some trust may form between parties, and, ultimately, people are more likely to support a decision or plan they help create. EM attempts to transcend the traditional antagonistic relationship between agency personnel and the public. Because 70 percent of the United States is privately owned, many environmental issues arise on private land--land that is only partially affected by federal and state natural resource legislation. EM allows groups to deal with these issues on private lands by establishing a dialogue between private and public decision makers. Finally, even though the EM decision-making style takes longer to conduct, time is saved in the end, because the decision achieved is more agreeable to all interested parties. Having all parties agree to a particular management plan decreases the number of potential lawsuits that can arise and delay the plan’s implementation.

Nonequilibrium ecology and EM

A change in the dominant theories in ecology has encouraged this switch to EM and an ecosystem-level focus.

The idea that environments achieve a climax state of homeostasis has been a significant theory in ecology since the early 1900s. This view, now discredited by most scholars, was most vigorously articulated by American ecologist F.E. Clements (1874-1945) and holds that all ecosystems have a particular end point to which they each progress, and that ecosystems are closed systems. Disturbances such as fires or floods are considered only temporary setbacks on the ecosystem's ultimate progression to a final state. This theory offers a certain level of predictable stability, the type of stability desired within traditional resource management. For example, if a forest is in its climax state, that condition can be maintained by eliminating disturbances such as forest fires, and a predictable level of harvestable timber can be extracted (hence, this theory contributed to the creation of Smokey the Bear, an icon for forest fire prevention, and the national policy of stopping forest fires on public land).

This teleological view of nature has ebbed and waned in importance, but has lost favor especially
within the past two decades. Ecologists, among others, have realized that from certain temporal and spatial points of view ecosystems may seem to be in equilibrium, but in the long term all ecosystems are in a state of nonequilibrium. That is, ecosystems always change. They change because their ecological structure and function is often regulated by dynamic external forces such as storms or droughts and because they are comprised of varied habitat types that change and affect one another.

This acknowledgment of a changing ecosystem means that predictable stability does not really exist and that an adaptive management style is needed to meet the changing requirements of a dynamic ecosystem. With all of the interactions and factors involved in an ecosystem’s operation, it becomes necessary to be adaptive and flexible when determining methods of ecosystem management and to focus less on predictions and control of ecosystems. EM is adaptive. After an EM decision team has formulated and implemented a management plan, the particular ecosystem is monitored. The team watches significant biotic and abiotic factors to see if and how they are altered by the management practices. If logging produces changes which effect the fish in one of the ecosystem’s streams, the decision team could adapt to the new data and decide to relocate the logging.

The ability to adaptively manage is a crucial aspect of EM, one that is not incorporated in traditional resource management, because the traditional management style emphasizes one or a few species and believes that ecosystems are mostly stable. In traditional ecosystem management, one only needs to view how a particular species fares to determine the necessary management practices; little monitoring is conducted and previous management practices are rarely altered. In EM, management practices are constantly reviewed and adjusted as a result of ongoing data gathering and the goals articulated by the decision team.

The future of EM

The future of EM in the United States and Canada looks stable, and other countries such as France are beginning to use EM. Many countries, however, lack the will or resources to implement EM strategies and techniques. A 2012 report by the World Bank revealed that organized crime conducts most illegal logging, with a majority of the profits going to corrupt government officials. Even in countries that have the will and resources to implement EM, there are many impediments to the successful implementation of EM. Institutions, such as the United States’ federal land management agencies, are often hesitant to change, and when they do change, it happens very slowly; there are still many legal questions surrounding the legitimacy of implementing EM on federal, state, and private lands; and though attempts are made to review the entire ecosystem using EM examples, ecologists still lack significant understanding of how even the most basic ecosystems operate. Even given these impediments, EM may be the primary land management style of the United States and Canada well into the future. Adaptive EM methods will enable users to learn more about ecosystems in the process of monitoring and management and thus have more detailed insight and involvement in the inner workings of an ecosystem. The continuous involvement required for adaptive management strategies is becoming more important in the face of climate change and imminent natural resource depletion.

- Ecosystem management

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