# **Ecosystem Management in the United States**

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With over a dozen US federal agencies with varied missions making commitment to ecosystem management, op erational expressions of ecosystem management in the US are quite diverse. The recent review by Grumbine (1994) found common themes in ecosystem management to be addressing both biological and social issues at appropriate scales and focusing on sustaining an ecosystem's capacity to produce goods and services rather than directing management strictly to meet commodity production objectives. While recognizing this diversity, I will briefly describe examples of just three aspects of ecosystem management in the US—biological assessments, landscape management perspectives, and adaptive management. I will emphasize examples from the Pacific Northwest because efforts to define and implement ecosystem management there have been prominent, divisive, and instruction and I know them best.

## **Bioregional Assessments**

Planning for management of natural resources in the US has typically focused on individual development of projects or jurisdictions, such as National Forests. Increasingly these scales of analysis and planning have been found lacking when the issues involve biophysical phenomena operating over large geographic areas delineated by natural processes, such as those operating within drainage basins or ranges of wide-ranging species. This has lead to special analysis and planning activities outside the legislatively defined scope: these bioregional assessments are a form of ecosystem management in the sense of dealing with ecological issues at their natural scale rather than within the confines of political boundaries. Bioregional assessments have covered significant parts of the US and varied issues—water resources, maintaining native species, ecosystem protection. The common theme is finding a new balance between maintaining desired properties of ecosystems and human uses of those ecosystems. These bioregional assessments have brought together scientists, policy makers, and land managers in very challenging circumstances to craft new policy with strengthened ecosystem perspective.

Recent reviews have identified some common themes running through many of bioregional assessments and resulting ecosystem management efforts (Gunderson et al. 1994, Crossroads Conference in Portland, OR in Nov. 1995). Holling (in Gunderson et al. 1994), for example, asserts that transitions in natural resource management occur at crisis points when ecosystems managed intensively for commodity extraction have lost resilience, communities have become dependent on production of those commodities, and management institutions have focused on efficient extraction. The resulting crisis commonly leads to an assessment and, in turn, to modified policy. The crisis atmosphere brings political attention and in some cases resources to deal with the issue. However, the crisis also reflects reduced social and ecological resilience which limit flexibility and opportunity for experimentation with new management approaches. In the Pacific Northwest of the US, for example, the legal and biological status of northern spotted owl and some salmon stocks limited experimentation that could lead to further declines. Also, crisis situations may preclude following simple rules of success in policy formulation, such as involving the major stakeholders.

#### Landscape management perspectives

A variety of factors have triggered rapid development of ideas concerning management of landscapes to balance economic and ecological interests. New developments include emergence of ecosystem perspective with increasing breadth, landscape ecology, geographic information systems, and the changing nature of natural resource issues. Earlier landscape management generally emphasized commodity extraction and mitigation of undesired impacts. A new perspective is to manage ecosystems within their natural or historic range of conditions in order to sustain native species. One approach managing from this view is to design management actions to be similar to the natural disturbance regime of a landscape in terms of frequency, severity, and geographic pattern of ecosystem disturbance. Examples now exist of how this scheme could be implemented in upland, forest landscapes, but applications of the concept in riparian systems await development. Linking terrestrial and stream/riparian systems at the landscape scale requires substantial conceptual and operational development. On the conceptual front, we must better understand how upland vegetation patchworks interact with stream, riparian, and road networks.

## Adaptive managment

Concepts of adaptive management (Walters 1986, Lee 1993) have attracted great attention in the US, appearing explicitly as the crux of developing future management systems in the President's Northwest Forest Plan, for example. At this time of major reordering of our natural resource management paradigm, adaptive management often seems a Holy Grail. In the Pacific Northwest we see many expressions of attempts to carry out adaptive management with varied levels and types

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of success. Adaptive management using rigorous, large, landscape-scale experiments implemented through management actions and monitoring is not occurring in any formal senses of which I am aware. Funding limitations, organized protest of management actions, and a variety of other disincentives for scientists and managers have limited this type of experimentation.

Ten Adaptive Management Areas established through the Northwest Forest Plan are assigned responsibility for testing and implementing new approaches to management and public involvement. Some Adaptive Management Areas emphasize social aspects and other focus on research-manager cooperation to pursue technical advances. It is too early to judge the successes and failures of this social institutional experiment with adaptive management. Here too limited funds and staff 4result in successes that seem small, but significant, such as increased cooperation and data sharing between federal agencies. Charting a new course for management of natural resources is a long, slow process.

Adaptive management in these formal senses are complemented by effective, long-term, research-management partnerships which have contributed to major change in management of natural resources in the region. Important attributes of these partnerships in the Pacific Northwest include independence of the science in part because much of its funding emphasizes basic science objectives independent of management. The key is scientists, managers, and public working together with a common general mission of constantly improving land management, but still retaining enough independence to maintain checks and balances.

In summary, ecosystem management in the US is quite diverse in form, scale and social/biophysical emphasis. In some regions past management and legal history constrain adoption of ecosystem management and adaptive management. The different social and land use contexts of Canada may provide greater opportunity to creatively develop ecosystem management and to conduct adaptive management in its sense of large scale experimentation.

### **Literature Cited**

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