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Ecosystem Management

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Highlights

- Ecosystem management strategies move away from single-species management to a more holistic, multi-species approach.
- Ecosystem management seeks to maximize ecological integrity while allowing for sustainable use of resources.
- Managers can implement some or all the elements of ecosystem management while developing their sustainable forest management system.
- Ecosystem management can be a key component or strategy in achieving sustainable forest management.

What is ecosystem management?

Ecosystem management, often referred to as ecosystem-based management (EBM) or simply the ecological approach, evolved from multiple-use management policies of the U.S. Forest Service in the Pacific Northwest, who formally adopted the concept in 1994. Canada followed suit with various initiatives such as the ecosystem-based British Columbia Forest Practices Code and Ontario Ministry of Natural Resources Forest Management Guidelines.

Ecosystem management is generally thought to be a response to the call for biodiversity conservation and marks a shift away from single-species management to a holistic (whole-systems), multi-species approach. Ecosystem management can mean different things to different people and has been widely interpreted. Most agree however, that the essence of ecosystem management is the over-arching goal to maintain or enhance ecological integrity of managed forests while sustaining resource development within these limits.

Rather than a strictly defined strategy, ecosystem management is more of a philosophy or concept. Ecosystem management is not simply about finding new ways to manage forests. It is a fundamental shift in thinking about forests in terms of maximizing ecological integrity while allowing for sustainable use of resources.

Characteristics of ecosystem management

Ecosystem management takes many forms and is specific to local circumstances. It is not easily defined by a strict list of criteria that labels one situation as "ecosystem management" and another as not. Rather, ecosystem management is typically thought to contain common elements to a lesser or greater extent. In this way, managers can think of a particular situation as tending towards good ecosystem management or not.

Ed Grumbine provided 10 dominant elements of good ecosystem management:

1. Using a hierarchical context: Focussing on any one level of the biodiversity hierarchy (landscapes, ecosystems, populations, species, genes) is not sufficient. Managers should consider the connections between all levels and scales.
2. Using ecological boundaries: Managers should define management units based on ecological boundaries at appropriate scales. This may require working across administrative boundaries and inter-agency cooperation.
3. Targeting ecological integrity: Managers should strive to maintain viable populations of native species and ensure representation of ecosystems across natural ranges of variability.

Example Management Objective: Retain a representative range of ecotypes and ecosystems in their natural state.

4. Collecting data: Ecosystem management requires research and data collection (e.g., habitat inventory/classification, disturbance regime dynamics, baseline species and population assessments), and good use of existing data.

Example Management Objective: Record benchmarks (baseline data) of the current forest condition at the stand level.

5. Monitoring: Managers should track the results of actions in an ongoing feedback loop so that success or failure can be evaluated quantitatively.

Example Management Objective: Ensure that each management indicator or target has a monitoring procedure.

6. Using adaptive management: Good ecosystem management assumes knowledge is provisional and focuses on management as a learning process and an opportunity for continual experimentation. This allows managers to remain flexible and adapt to uncertainty.
7. Encouraging inter-agency cooperation: Using ecological boundaries requires cooperation between agencies. Managers and organizations must learn to work together and integrate their objectives and practices.

Examples of agencies: Regional and local municipalities; First Nations; DFO - Department of Fisheries and Oceans; Environment Canada; Parks Canada.

8. Prompting organizational change: Implementing ecosystem management might require changes to the structure of resource management agencies and the way they operate.

9. Embedding humans in nature: People should not be separated from nature, and are a fundamental influence on ecological patterns.
10. Addressing human values: Regardless of the role of scientific knowledge, human values are recognized and play a dominant role in ecosystem management.

Other important elements of ecosystem management that have emerged are:

- Biodiversity: Maintaining biodiversity is at the heart of ecosystem management and was a driving force behind its adoption in forest management policy.
- Sustainability: A fundamental premise of ecosystem management is the sustainable use of the forest for present and future generations.
- First Nations and stakeholder involvement: Involvement and collaborative decision-making with First Nations and stakeholders are often considered a key component of ecosystem management. Socio-economic objectives are typically at the forefront of an ecosystem management plan and provide input into forest values that are important and should be maintained through time.
- Large spatial scales: Ecosystem management generally requires management over large spatial scales, implying landscape-level management to encapsulate the forest ecosystem concept.
- Long time scales: As with sustainability, ecosystem management uses long time scales with objectives and forest conditions managed for future generations.
- Management goals: Generally, ecosystem management must be based on a clear set of operational and management goals that respect the ecological tolerances of the ecosystems and values of interest.
- Knowledge: Many emphasize the need for a deeper understanding of the ecological, social and economic systems which form the basis for ecosystem-based management. Understanding ecosystem dynamics is an important component of ecosystem management.

Forest policy movement towards ecosystem management

Managers sometimes argue that ecosystem management is simply a new label for what they have been already doing for years. However, there are fundamental differences between some existing practices and ecosystem management. Traditional forest management philosophy and policies typically maximize human use of the forest subject to environmental constraints. In other words, they aim to minimize the environmental impact while maximizing human benefits. In contrast to this, ecosystem management differs by seeking to maximize ecological integrity subject to the need to allow sustainable use of the resource. Ecosystem protection is raised as a priority and balanced against the needs and wants of people.

While there is a general tendency for forest policy to move towards ecosystem management, the need for trade-offs between various tenure arrangements, public values and over-all provincial land management means that ecosystem management has not been fully incorporated into Canadian provincial policies.

Hamish Kimmins suggests that forest policy has evolved from its earliest beginnings through four phases to arrive at ecosystem management today (Figure 1). Ecosystem management can be thought of as a point along a continually-evolving course from unregulated exploitation to ecologically-based, multi-value ecosystem management.

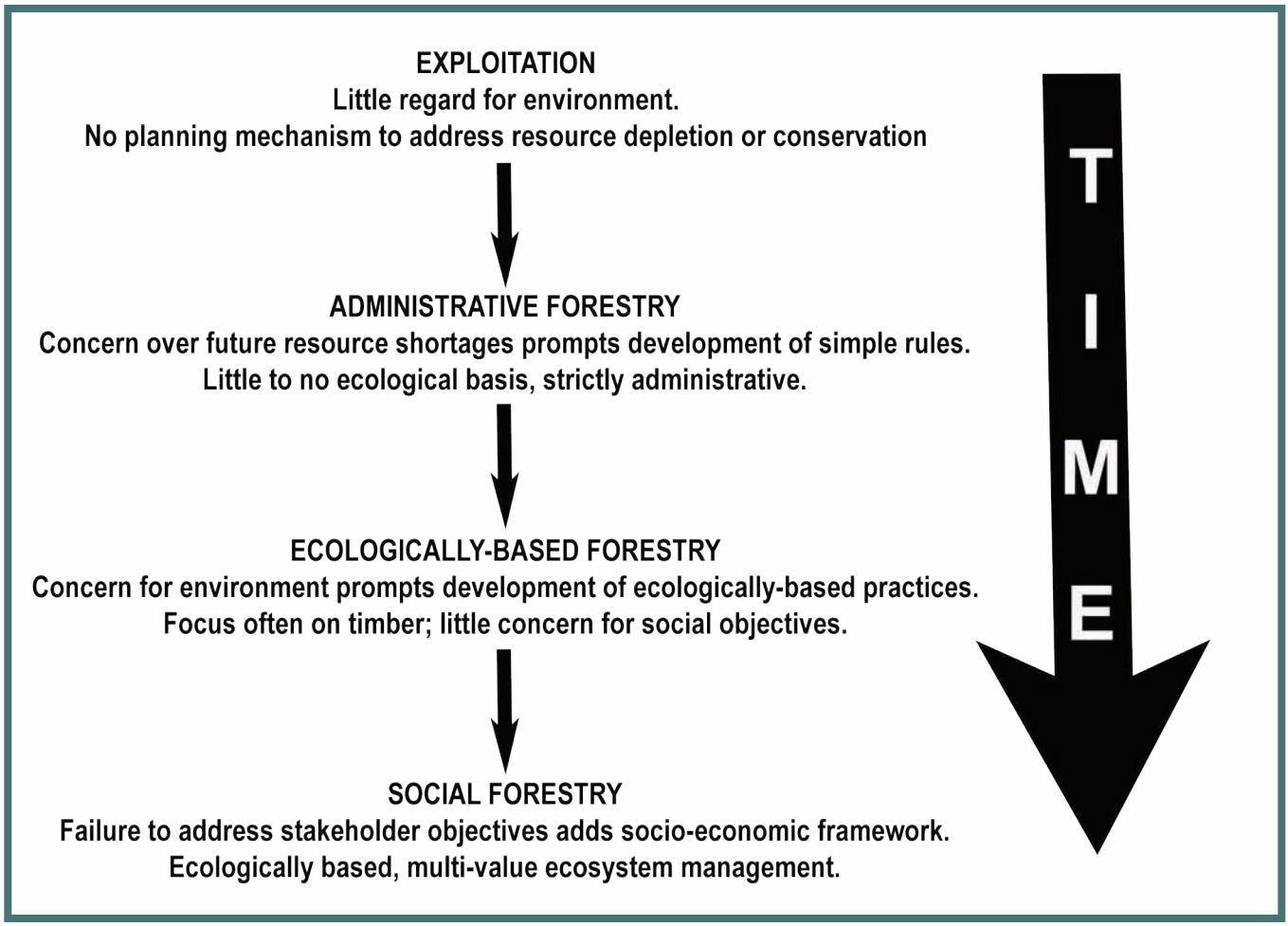

Figure 1: The evolution of forest policies through time as suggested by Hamish Kimmins, University of British Columbia.

Incorporating ecosystem-based approaches into management plans

Managers should consider incorporating elements of ecosystem management in their current management strategy wherever they are along the continuum (Figure 1). Like sustainability, ecosystem management can be thought of as a moving target that can continually be improved upon and re-defined. In this way, managers can take specific elements of ecosystem management and incorporate them without the need for completely revising their existing management strategies. The important part is to be moving towards ecosystem management, even if it is not achieved immediately.

Many elements of ecosystem management are directly specified in forest certification requirements. Certification standards may be useful sources of information for including elements of ecosystem management into a forest management plan.

Implementing ecosystem management is an organizational commitment requiring the support of all company managers, including senior management. Ecosystem management strategies need to be incorporated into strategic and operational plans in order to ensure their implementation. Ecosystem-based management plans should describe both planning and operational practices, including objectives

and expected outcomes that will be combined during implementation. Elements of a good ecosystem management plan are outlined in the side box.

Ecosystem management or an ecosystem-based approach is promoted by many environmental non-governmental organizations and is generally viewed favourably by the public, bringing a strong social license and public approval to companies implementing an ecosystem-based management strategy.

Characteristics of a good ecosystem management plan:

- **There should be a single, coordinated management plan implemented by a single agency or organization.**
- **The plan should have clearly defined operational goals that respect the ecological integrity of the forest ecosystems.**
- **The plan should be based on an ecological classification/ inventory system useful for forest management and planning purposes.**
- **The plan should be area-based with management units defined with ecological boundaries.**
- **The spatial and temporal scale of the ecosystem management plan should be sufficient to achieve ecological targets.**

Implementing ecosystem management in Canada

Most agencies and organizations across North America have officially adopted the ecosystem management concept. However, implementing ecosystem management is a challenging task and difficult to do well. Some examples of organizations and companies working to implement ecosystem management are listed below.

- Clayquot Sound in British Columbia was one of the first and best-known applications of ecosystem management. The Clayquot Sound Scientific Panel introduced ecosystem management as a tool for future planning decision in the mid-1990s and is particularly inclusive of the social aspects of ecosystem management.
- Alberta-Pacific Forest Industries Ltd. (ALPAC) in northern Alberta has implemented a forest management regime with an emphasis on maintaining biodiversity by working with the forest's natural systems.
- In Quebec, Tembec and Abitibi-Consolidated are piloting ecosystem management approaches with the intent of incorporating them into operational management plans.
- The New Brunswick Department of Natural Resources and Energy are using ecological representation analysis as a key element in their wildlife habitat planning and guidelines development process.

Ecosystem management and SFM

Ecosystem management and sustainable forest management (SFM) are closely related concepts. SFM is fundamentally about sustainably managing forests to meet ecological, economic and social objectives. While not exclusive to SFM, issues of sustainability and socio-economics are more clearly expressed and targeted within the SFM framework and involve trade-off analysis in order to balance values and objectives. Ecosystem management's focus is clearly on maintaining or enhancing the ecological integrity of managed forests. While there is much overlap between ecosystem management and SFM, ecosystem management can be thought of as a key component or strategy in achieving sustainable forest management.

Further reading

Alberta-Pacific Ecosystem Management: http://www.alpac.ca/Forest_Management/EcosystemManagement.htm

Clayquot Sound Scientific Panel: www.iisaak.com/sciencepanel.html and www.cortex.org/dow-cla.html

Grumbine, R.E. 1994. *What is ecosystem management?* Cons. Biol. 8:27-38.

Kimmins, J.P. 2003. *Forest ecosystem management: an environmental necessity, but is it a practical reality or simply an ecotopian ideal?* World Forestry Congress, Quebec, Quebec. Available from the author via e-mail: Hamish.kimmins@ubc.ca

Mabee, W.E., and others. 2004. *Evolving ecosystem management in the context of British Columbia resource planning.* BC J. Ecosys. and Manage. 4(1). Online: www.forrex.org/jem/2004/vol4/no1/art5.pdf

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