Ecological Forest Management: An Overview

The traditional focus of forest management, which continues to be reflected in the Forests Act of Alberta, has been on "establishing, growing and harvesting timber in a manner designed to provide a perpetual sustained yield"[1]. Ecological forest management (EFM) represents a new direction in management, developed in response to changing societal values and accumulated scientific knowledge. There is an explicit recognition that forests are valued not only for their economic potential, but also for the biodiversity they contain, the ecological services they provide (e.g., clean air and water), and the recreational, cultural, and spiritual opportunities they provide.

Core objectives:

- To maintain key ecosystem processes characteristic of the forest
- To conserve native biodiversity characteristic of the forest
- To provide a stable and sustainable flow of economic benefits from the forest for current and future generations.

Fundamental principles:

- The integrity of the forest ecosystem as a whole must be maintained if the forest is to provide us with the wide array of benefits that we now desire from it, along with the flexibility to meet different needs in the future.
- The forest has a finite ability to meet the demands placed on it.
- Incremental losses of the forest land base through conversion to agriculture, road building, and deletions associated with industrial activities must be minimized.
- Where there is a threat of serious or irreversible damage to any forest ecosystem, lack of full scientific certainty will not be used as a reason for failing to implement appropriate measures to avert the threatened damage.

The Natural Disturbance Model:

- The maintenance of biodiversity in the presence of industrial resource extraction cannot be accomplished through the individual management of species because there are too many species involved and our understanding of their needs is inadequate.
- The Natural Disturbance Model is an alternative approach, based on the assumption that biodiversity can be maintained in the presence of industrial use if industrial practices are made to approximate natural disturbances.
- In practice, the Natural Disturbance Model entails the management of human disturbances to maintain ecological patterns and processes within their typical range.
- For the Natural Disturbance Model to be successful, long-term targets for forest structure and pattern are required and the activities of all industrial users must be integrated, with the aim of achieving those targets.

[1] Forests Act of Alberta, section 16-1.

Protected areas:

- Because of limitations with the Natural Disturbance Model, and the inherent unpredictability of natural systems, a complete reliance on the Natural Disturbance Model to maintain biodiversity would entail substantial risk. The limitations of the NDM do not invalidate its use, but imply that a complementary system of management, specifically designed to maintain biodiversity, must be implemented on a portion of the land base. This is the primary role of protected areas that are designed to maintain ecological integrity.
- Additional roles of protected areas, within the context of EFM, include: (1) ecological benchmarks against which the success or failure of the Natural Disturbance Model can be assessed (see below), (2) conservation of wilderness, and (3) sites for future research on natural ecological processes.

Endangered species:

- Some species, because they are endangered or highly sensitive to industrial activities, will require extra attention to ensure their viability. Where the range of these species cannot be fully incorporated into protected areas, modifications of the Natural Disturbance Model will be required, including specialized restrictions on industrial activities.

Monitoring:

- EFM recognizes that all management prescriptions are, effectively, working hypotheses, with substantial levels of uncertainty regarding the outcomes. Consequently, monitoring is an integral component of EFM, designed to evaluate whether the system overall is responding as predicted.
- Using feedback from monitoring, adjustments can be made to assumptions, models, and management practices in an effort to rectify any observed deviations. This process of feedback and adjustment has been termed adaptive management.

Research:

- Research is required to support the implementation of the Natural Disturbance Model, by providing a more complete understanding of ecological processes, including natural disturbances regimes, and determining how human disturbances (e.g., clear-cutting) differ from natural disturbances (e.g., fire). Research is also required as part of the adaptive management process, to determine the causes of any observed deviations from desired management outcomes.

Decision-making:

- EFM is not a static set of prescriptions, but a process that evolves in response to changing public values and new scientific information. Rates of forest harvesting and other decisions pertaining to land and resource use are made within the context of the desired future forest, not the growth rate of trees or mill capacity.
- Public involvement is a key component in identifying and weighing the social, economic, and ecological values to be sustained in the desired future forest. All of the information used in planning and decision-making processes should be available to those who wish to be involved.