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Adaptive management: learning from doing in the face of uncertainty

This research note summarizes Chapter 21, “Adaptive management: progress and prospects for Canadian forests”, by Peter Duinker and Lisa Trevisan, from the book *Towards Sustainable Management of the Boreal Forest*. 2003. NRC Press, Ottawa, Canada.

Highlights

- Adaptive management is a rigorous structured process designed to improve management policies and practices by learning from the outcomes of operational programs.
- It is a sound and solid way for managers to proceed in the face of uncertainty.
- The six essential steps of an adaptive management process are: (1) assess the problem, (2) design the plan, (3) implement the plan, (4) monitor the results, (5) evaluate the outcomes, and (6) adjust the plan.

What is adaptive management?

Adaptive management is a structured rigorous process designed to improve management policies and practices by learning from the outcomes of operational programs. It is this structured process at an operational scale, and a focus on deliberately designing management to enhance learning, that distinguishes it from trial and error, field trials, and other less structured approaches.

Why use adaptive management in forestry?

Forest management by its nature is extremely complex and full of unknowns. One of the cornerstones of sustainable forest management is gaining and applying new knowledge. Arguably however, one of the largest challenges facing forest managers is a lack of available knowledge and understanding of the system, resulting in a potential lack of confidence in their actions. Although often faced with this situation of insufficient information and high uncertainty, managers have the onus of making decisions and implementing plans on a daily basis, and in some jurisdictions, bearing the legal and professional responsibility for those decisions.

Adaptive management is a way for forest managers to proceed in the face of these challenges. It provides a sound alternative to “charging ahead blindly” or “being paralysed by indecision”. Adaptive



management provides a framework for addressing questions and incorporating knowledge while implementing management policies and practices.

Who should use it?

Adaptive management can be applied to most management situation where knowledge gaps result in uncertainty about which course of action to take. Since this describes most resource management situations, it is no surprise that adaptive management has its roots in ecological systems, and more recently in forest management. Many forest certification schemes promote the use of an adaptive management approach.

Because adaptive management is meant to be implemented at broad operational scales, it is typically led by managers or planners charged with managing the landbase. However, given its broad scale, all levels of management from field operations to strategic and business planning must be supportive and committed to the process.

The key elements of adaptive management

Adaptive management is often confused with trial and error (trying different things in the hope that something will work) and field trials (small-scale, site-specific, unreplicated). Any gains in knowledge from these less-structured approaches are often limited, haphazard, and undocumented.

Conversely, adaptive management is designed to produce broad, definitive, and documented knowledge that progressively moves management towards better solutions. Three key elements that define adaptive management and distinguish it from other approaches are:

- 1) It is a structured multi-step process within a definitive experimental framework intended to produce clear and tangible results.
- 2) It is performed at a broad operational or program scale.
- 3) Management alternatives are treated as experiments which encourage innovation and learning from mistakes.

Passive versus active adaptive management

Two forms of adaptive management have emerged: passive and active. Passive adaptive management refers to the more common situation where managers implement a single policy or practice alternative – assumed to be the best alternative – the results of which are monitored and evaluated. In an active adaptive approach, management practices are designed as experiments to test alternatives and reveal the best management option. The experimental approach of active adaptive management provides much stronger and rapid gains in knowledge and understanding. However, a passive approach can yield important results when an active approach is impractical or impossible.

The six steps of an adaptive management process

The defining element of a true adaptive management process is, in fact, the rigorous application of the process itself. It is strict adherence to the process, and all steps in the process, that distinguishes adaptive management from other processes such as trial and error. The following six critical steps are illustrated in the figure on page 3.



Step 1: Assess the problem. This step often involves facilitated workshops where knowledgeable participants define the management circumstances, bound the problem, and identify the relevant values, goals, and objectives.

Step 2: Design the plan. This step includes designing an action plan and monitoring program that will provide reliable feedback to gauge the effectiveness of the actions. The use of predictive models is usually an important component.

Step 3: Implement the plan. The plan is put into practice, and actions are taken as prescribed in the plan.

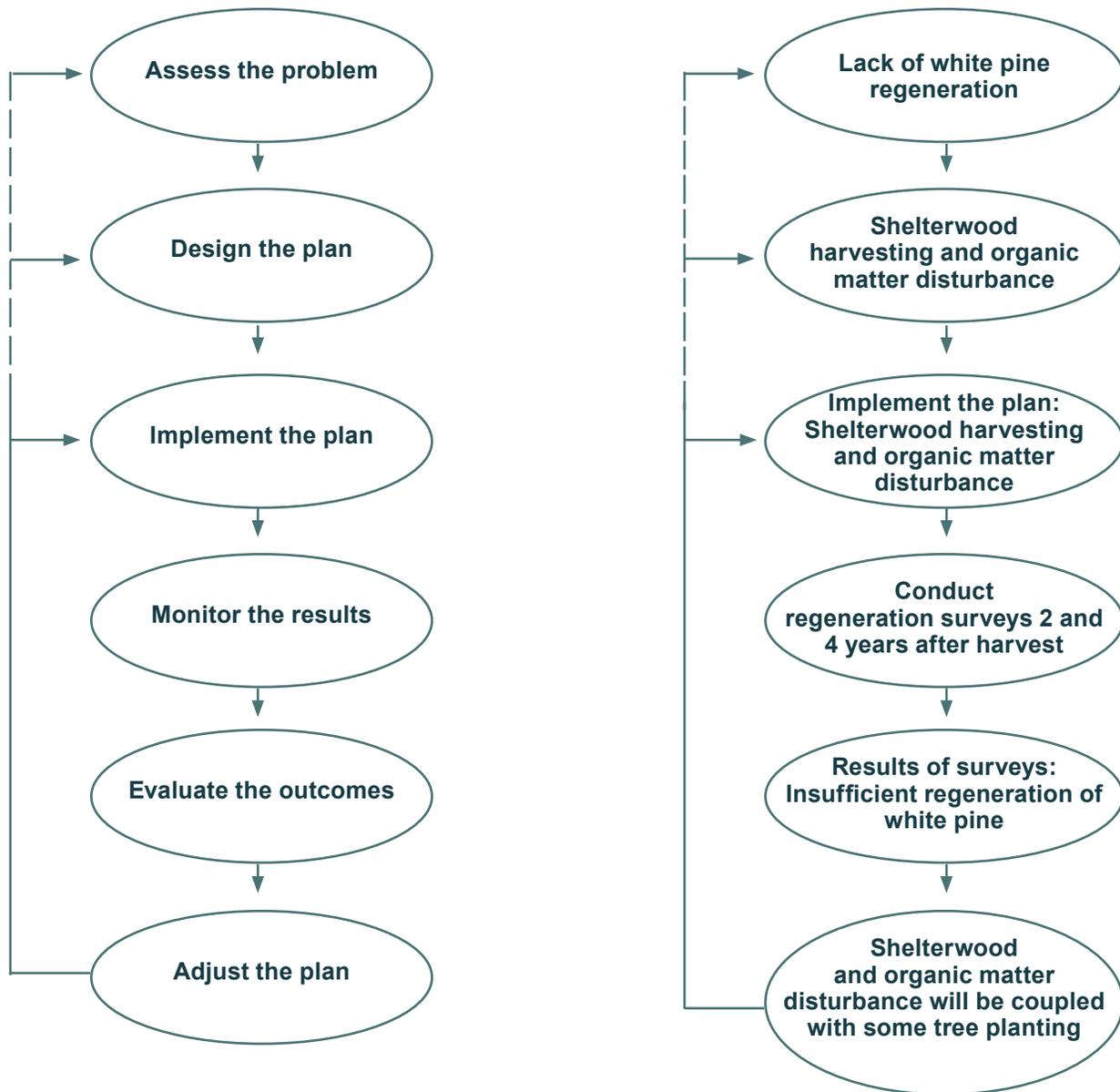


Figure 1 : Six steps (left) and a hypothetical example (right) of an effective adaptive management framework. Following adjustments to the plan, options exist to reassess the entire problem, redesign the plan, or implement an adjusted plan.



Step 4: Monitor the results. This step involves measuring indicators that can be used to assess the effectiveness of the actions in achieving their objectives.

Step 5: Evaluate the outcomes. Actual outcomes are compared with predictions and the differences are interpreted.

Step 6: Adjust the plan. Objectives, predictions, and practices are adjusted to reflect new knowledge and understanding. In turn, new knowledge and understanding gained from the process may lead to a reassessment of the problem, a redesign of the plan, or implementation of an adjusted plan.

Examples of adaptive management in Canada

Although adaptive management as a concept is decades old, good examples of adaptive management are relatively rare – no doubt because it is challenging to do well. Canada’s Model Forest Network, however, provides two good examples of practical adaptive management in Canadian forest management: The Fundy Model Forest in New Brunswick, and Resources North Association (formerly the McGregor Model Forest) in British Columbia (see web links below). Partners at the Fundy Model Forest based their management plan on their vision of adaptive management. Their planning process includes steps identified by an adaptive management process. The Resources North team established an adaptive management program as one aspect of the model forest’s approach to sustainable forest management. The approach focuses on the use of indicators in all aspects of forest management and allows regular assessment and modification consistent with the principles of adaptive management.

Implementation Considerations

Although adaptive management offers the potential of large returns in learning and knowledge gain to forest managers – and ultimately leading to better forest management – implementing an effective adaptive management plan is as challenging as it is rewarding.

- **Monitoring:** While the essence of adaptive management is a process, it requires solid and sound content. It is essential to have well-designed experiments and effective monitoring programs. Managers will need to address the challenge of securing long term funding and sufficient staff for a monitoring program.
- **Adapting management practices:** Once a monitoring program is in place, it is important to clearly define which indicators will be monitored, and identify at which point a change in indicators will trigger a change in management actions.
- **Corporate commitment:** Despite widespread use of the term, adaptive management is generally not well-understood by resource managers and professionals. In educating themselves about adaptive management, all levels of management from the top down, must be fully supportive and committed to the process. Maintaining corporate commitment to adaptive management can be challenging, particularly following corporate mergers or in times of high staff turn-over. Managers will need to work to ensure that support is maintained during staff and corporate transitions.
- **Regulatory approval:** In addition, obtaining support and approval from government regulators for an adaptive management plan may be restrictive in some jurisdictions. Close communication with government staff will assist in identifying and minimizing any challenges to plan approval.



Initiating an adaptive management program

First and foremost, one must gain a thorough understanding of what adaptive management is and what it involves (see links and further reading below). Full and committed support must be obtained from all levels of management in the organization. Securing adequate resources over the long term is critical to the success of an adaptive management program. Finally, it may be necessary to gain the services of a skilled and knowledgeable person(s) able to assist in designing an appropriate experimental approach and monitoring program that will achieve the goals of the plan. From this base, an effective adaptive management program can be designed to address the questions and provide solutions while maintaining operability.

“The critical need today is not better ammunition for rational debate, but creative thinking about how to make management experimentation an irresistible opportunity, rather than a threat to various established interests.”

- Carl Walters 1997

Further reading

The American Adaptive Management Areas Network. Online: <http://www.reo.gov/ama/index.htm>

British Columbia Ministry of Forests and Range Adaptive Management Publications. Online: http://www.for.gov.bc.ca/hfp/amhome/am_publications.htm

Duinker, P. N. and L.M. Trevisan. 2003. *Adaptive management: progress and prospects for Canadian forests*. In : P.J. Burton, C. Messier, D.W. Smith, and W. Adamowicz. Towards sustainable management of the boreal forest, pp. 857 – 892. NRC Press, Ottawa, Canada (available from the SFMN office in Edmonton).

Fundy Model Forest. Online: <http://www.fundymodelforest.net>

MacLean, D., P. Etheridge, J. Pelham, and W. Emrich. 1999. *Fundy Model Forest: partners in sustainable forest management*. For. Chron. 75 : 219-227.

Resources North Association (formerly McGregor Model Forest).
Online: <http://www.mcgregor.bc.ca/mmf>

Taylor, B., L. Kremsater, and R. Ellis. 1997. *Adaptive management of forests in British Columbia*. British Columbia Ministry of Forests, Victoria, BC. Online: <http://www.for.gov.bc.ca/hfd/pubs/docs/sil/sil426.htm>

Walters, C. 1997. *Challenges in adaptive management of riparian and coastal ecosystems*. Cons. Ecol. 1(2): 1. Online: <http://www.ecologyandsociety.org/vol1/iss2/art1>



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