

Patching Together the Future of Forest Modelling

A Status Report on the Implementation of Spatial Modelling in Forest Management Planning

Introduction

'Patching Together' is a descriptive analogy that adequately describes the current efforts surrounding the implementation of spatial modelling in forest management planning. Two 2009 planning teams have embraced the challenge of integrating the old (SFMM) and the new (Patchworks) in a hierarchical decision support system for planning. The approach is bringing together a collaborative network including the planning teams, FRP core teams, MNR (Districts, Region, and Branch) organizational units and Spatial Planning Systems.

The hierarchical modelling approach utilizes the strengths of the Strategic Forest Management Model (SFMM) and Patchworks to form a comprehensive decision support system for planning. In this arrangement, SFMM plays an important role in establishing the natural benchmark run and scoping conclusions for the development of feasible management objectives. The strategic direction that is narrowed in SFMM is the starting point for Patchworks to refine the strategic objectives into a tactical plan that simultaneously deals with strategic, spatial and operational plan objectives. The result is a robust harvest schedule that considers spatial policy requirements and economic feasibility constraints. The following table provides an overview of the expected pros and cons associated with the hierarchical approach for planning.

Pros	Cons
Use of non-spatial model (SFMM) promotes understanding and collaboration with respect to base model inputs.	Analysis requirements of planning will take longer (development of two models, more spatial data preparation and longer solve times for the spatial model).
Hierarchical approach addresses concern of slow solve times associated with the spatial model through use of non-spatial model for most of the recursive coarse scale analysis (scoping, sensitivity etc.)	Maintaining consistency between two models may require more work than conventional single model process on an ongoing basis.
Hierarchical approach addresses concern of providing process requirements that cannot be provided by spatial models (expected rates of natural depletions, benchmark model).	The clear distinction between strategic and operational planning is not clear. This may lead to confusion regarding expected FMP products for various check-points and stages in the planning process.
Hierarchical approach provides an easy escape plan if spatial modelling becomes problematic during the planning process.	New modelling paradigm may be unfamiliar to many on the planning team and create some uncertainty or wariness in the results
Hierarchical approach fits well into current planning process	
Use of spatial model will allow planning teams to develop more economically feasible harvest schedules and will facilitate a quantifiable trade-off analysis for all management targets.	

Two variations of the hierarchical modelling approach are being adapted to the Nipissing and Romeo Mallette Forest Management Plans. The Nipissing plan is retaining SFMM as the lead strategic model and using Patchworks modelling results to 'calibrate' the otherwise non-spatial SFMM solution. Patchworks will also be used to develop a tactical allocation of the resulting SFMM available harvest area (AHA). The Romeo Mallette plan has opted to use Patchworks as the primary strategic model. In this case, Patchworks will be used to determine the AHA and tactical allocation directly.

The variations on the modelling approaches and the collaborative working environment promises to provide a very valuable learning experience for everyone involved. This experience will pave the way for future use of spatial modelling in forest management planning.

Summary of Activities

A collaborative framework is a critical component to any forest management planning process but is even more critical when new approaches are being developed and tested. In both of these plans, the FRP core teams have been playing an important role in bringing the right people together to establish methodologies, approaches, and sometimes solutions to challenges that the need to be overcome.

To date, both planning teams have developed SFMM base models and are well on the road to Patchworks base models in preparation for stage one public consultation. Throughout this process, a number of challenges have been addressed related to data preparation and modelling methodologies. A brief summary of some of this work is listed as follows:

- Development of strata based natural succession assumptions in the modelling inventory.
- Development of new software to facilitate deterministic post-renewal succession assumptions for spatial modelling (Silvicultural Treatment response Apportioning Program aka STRAP)
- Patchworks software updates including SFMM conversion routines, modelling input methods, and post-process tools for evaluating landscapes (Marten, NDPEG).
- Development of methodologies for addressing FMPM and policy requirements and ongoing documentation of implementation experiences for future consideration (Spatial Modelling Best Practices – Working Document).
- District workshops on spatial modelling.
- Comprehensive FMP process schedule for analytical products required in a hierarchical modelling approach

All of the activities listed above have been supported by a 'joint core team' group that consists of both the FRP Northeast and Nipissing Core team members, key members from each planning team, Spatial Planning Systems and members from District, Region, and Forest Management Branch of the MNR. As listed above, a best practices working document is being maintained that describes the implementation challenges, proposed methodologies, and implementation experiences. It is expected that this document will be a pre-cursor to spatial modelling best practices and provide possible solutions for future planning teams.

Conclusions

As the planning teams progress towards public consultation stages, the most critical time to gauge the success of spatial modelling in an FMP is quickly approaching. Though it is somewhat premature to discuss success or failure, some of the most important factors in our success to date are apparent. The following is short list of keys to success along with a brief description of the importance to the Nipissing and Romeo Mallette FMP's:

1. **Collaboration and Team Work** – A joint core team has been established. This team engages in regular conference calls and face to face meetings. This group acts a decision making body and sounding board for developing approaches and methodologies for spatial modelling implementation. To date, MNR staffs (analysts and foresters) in the region and district have been very progressive and supportive of spatial modelling implementation. Without support from these key members, the milestones already achieved would not have been possible. In turn, Tembec and Nipissing Forest Resource Management have maintained an open and communicative environment for planning.

2. **Dedicated Analyst(s)** - The FRP has been a major contributor to the implementation of spatial modelling by resourcing forest analysts that are dedicated to spatial modelling. It is clear from our experience thus far that at least one dedicated analyst should be assigned to the planning team to ensure that this increasingly specialized skill set is available to the planning team throughout planning.
3. **Communication and the Spirit of Innovation** - Fundamental aspects of planning are altered in a hierarchical planning approach among the most significant is the lack of clear break from strategic to operational planning in the FMP process and the ability to include spatial policy direction directly in management strategy development. These concepts require significant departure from conventional concepts such as the long term management direction and available harvest area. Thus far, the planning teams have maintained open communication and a spirit of innovation that is accepting of changes and modification to conventional approaches to modelling.

Implementation of spatial modelling in forest management planning is a process that requires team work, collaboration and a spirit of innovation. The MNR through efforts such as the establishment of the Forest Analysis and Modelling Unit has been actively working to improve forest analysis capabilities with a major objective of supporting spatial modelling. The two plans currently undertaking spatial modelling will bring the total number of plans completed using a spatial model in Ontario to three. The hierarchical approach being 'patched' together by these two planning teams will most definitely support future planning teams that wish to take advantage of the many benefits of a decision support system that includes spatial modelling.