Woodstock Forest Management Planning at MacMillan Bloedel Ltd., Nanaimo B.C.

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Remsoft's Invited Author Series

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Introduction

The following discussion expresses a number of my personal opinions. These may not necessarily reflect the views, beliefs or policies of MacMillan Bloedel Limited. I assume full responsibility for them. My discussion of the use and application of Remsoft's Woodstock Forest Management Planning Software are limited to its use for linear programming-based forest management planning. Readers should be aware that Woodstock has other features not strictly limited to linear programming.

As a business entity in an industrialized society, MacMillan Bloedel Ltd.'s objectives are relatively easy to articulate, and are transparent within market forces and greater society. This ease of articulation of objectives and responsibility to maintain their transparency give credence to the utility of a linear-programming (LP) based forest management model. Linear programming allows for a very clear statement of forest management objectives. Where objectives are in competition with each other, as is the case with providing for the multiplicity of goods and services in managing forests, linear programming solutions provide empirical estimates of trade-offs. Members of society who choose to consume (or forgo present consumption of) these non-timber or timber based goods and services, may decide for themselves if resource valuations implied by such trade-offs are consistent with their own sets of values.

The Problem

The preceding explanation makes land use and forest management decision-making processes in British Columbia sound easy and simple to apply. Reality indicates they are anything but. Why is this so? Well, the answer to that question is perhaps long and complicated, but I believe at least in the context of the role of forest management decision software, the following abbreviated interpretation of history may explain some of the answer.

Software for applying linear programming solutions to forest management problems has been available in British Columbia for about the past thirty years. Applications of linear programming for timber supply and forest management problems however have been highly ephemeral during this period. Given LP's ability to allow for a clear problem statement and identify trade-offs between objectives, why has its application and use in B.C.'s forest sector been of such a limited nature? I have often asked myself this question, and it is easy for me to come up with a large number of reasons. The difficulty arises in trying to rank these reasons, in terms of their significance in answering the question. I guess if I have to pick the top three, they would be as follows:

"Linear programming allows for a very clear statement of forest management objectives."

1. LP theory and methods are not taught (or learned) in a consistent fashion by all forestry professionals. Although I have no empirical information, it is my considered opinion that few forestry professionals have sufficient exposure to mathematical programming in their formal education to allow for practical application in a work situation.

2. A clear and obvious statement of your objectives can make life difficult for you. Many people have problems with a typical forestry LP problem that maximizes some value (or volume) of timber, subject to maintenance of a number of non-timber amenities. It is somehow interpreted that timber production (or net revenue) stated in an objective function assumes superiority over the provision of non-timber amenities, which are "constraints", and somehow hold less value. Such a problem statement in and of itself makes no prior assumption about relative values. It is the user, or interpreter of the LP problem who must still assign values, if she so chooses. Therein lies the real problem, one is ultimately forced to make what might be a difficult or controversial choice. However, rare is the case where those faced with such choices have the empirical basis on which to make choices as would be provided by an LP problem analysis.

3. The concepts of shadow prices, duality theory, and marginal returns, are not taught (or learned) in a consistent fashion by most forestry professionals. It is no secret that most forestry professionals have at least an inherent mistrust, if not an extreme dislike (in my experience usually based on ignorance) of economic concepts. Maximization of economic parameters is seen to come at the expense of what are considered more socially fashionable or politically correct objectives such as ill-defined notions of sustainability. This is often due to a lack of ability to distinguish between the choices made to generate

economic wealth and choices made to distribute wealth across society and generations. Research Lab in Victoria, and the University of New Brunswick. Since that time (1993), Woodstock's capabilities have expanded and improved.

"Wildlife habitat conditions for a variety of species have been defined over most of MB's forest tenures."

Woodstock's use at MacMillan Bloedel Ltd. began about six months ago. However, individuals in the company are no strangers to the development and use of mathematical programming applications to solve a wide variety of problems over the previous twenty years. These include, log inventory distribution, forest land valuation, strategic harvest level planning, and defining trade-offs between timber and non-timber amenities. Woodstock LP applications will play an important role in the present and future direction of some of these applications, as described in the following paragraphs.

Detailed descriptions of harvest level projections have allowed for more meaningful linkages between strategic and operational planning. For example, a 1-year period Woodstock model was prepared for MB's private forest land, to include existing operational plans (using the Lpschedule option). Target harvest levels by various stand types and ages down to a sub-basin watershed level are provided to operational engineers. Demand-side variables such as species/grade price projections, are combined with harvest cost distributions in creating these analyses. Discounted net revenue from harvesting is used in the objective function and various scenarios are run to test sensitivities with price and cost assumptions.

Wildlife habitat conditions for a variety of species have been defined over most of MB's forest tenures. Projection of these conditions relies on traditional forest inventory parameters, and can be readily imported in a Woodstock model. Wildlife habitat quantities and conditions will be used in LP constraint definitions for Block 2 of TFL39 (about 200,000 ha.). These will be compared to forest cover conditions for late seral and old growth representation constraints as recommended by the B.C. Forest Practices Code Biodiversity Guidelines.

Harvest practices based on a more explicit recognition of wildlife habitat and old growth amenity values are being phased in over a five-year period across all forest under MB's management in British Columbia. This includes both private and public land. Woodstock models of the land base allow for the definition of zones of harvest disturbance intensity, definition of several regeneration systems, and the economic implications of shifting harvest profiles due to zoning, and possible shifts in log value at the stand level.

Considerable analyses of financial and growth and yield impacts for rotation ages consistent with profit maximization have been conducted at the stand level. These analyses have resulted in a move toward managing a significant area of MB's private land on a financial rotation. Short

and long term impacts on expected harvest flows, forest investment strategies, and log inventory analysis will be reviewed using Woodstock LP models.

In summary, Woodstock provides a very flexible analytical framework with which to design models that are very simple and easy to communicate, or very intricate and complex to include explicit operational detail in forest management plans. Flexibility allows one to bring together elements of the demand side, the supply the side, and the policy context of the day. In future I hope we can spend more time communicating the results and implications of our Woodstock modeling efforts, so that everyone concerned has a greater appreciation for who pays and who benefits from the forest management choices and values that both drive and are products from our modeling efforts.

About the Author

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