Book Review

Decision Methods for Forest Resource Management

Joseph Buongiorno and J. Keith Gilless

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Powerful, computer-based methods for assisting in forest resource management often have a poor reputation as complex 'black boxes' that really focus only on timber production. The textbook written by Buongiorno and Gilless should go a long way towards dispelling this reputation. This book is a substantially revised and extended version of their 1987 text — *Forest Management and Economics: A Primer in Quantitative Methods* — with greater emphasis on ecological objectives and hands-on computer use.

Buongiorno and Gilless designed this textbook for 'senior undergraduates … with little patience for theory, particularly those who … chose forestry to walk in the woods, not to dissect arcane equations', and their example-based presentation is well suited to this audience. The style is also most appropriate for professionals in forestry, natural resource management, or other fields of environmental science who need to be involved with the 'organisation, use and conservation of forests and related resources'.

The examples used throughout are readily understandable and cover a full range of forest management objectives, including a balance of ecological and economic perspectives. Even- and uneven-aged examples are included and, although the examples are USA-centric, the principles can easily be adapted to Australian conditions. The examples of the uneven-aged management of sugar maple forests, in particular, are very simplistic in comparison with the realities of managing uneven-aged eucalypt forests, but still allow the reader to understand the principles and set up their own more realistic case for Australian conditions.

The range of methods covered includes Linear Programming; Integer Programming; Goal Programming; Critical Path Method (CPM); Project Evaluation and Review Technique (PERT); Dynamic Programming; Simulation; Markov Chains and Econometric Analyses. To avoid miring the reader in the technical detail of each method or causing the reader to simply view these as black boxes, Buongiorno and Gilless formulate and solve problems by each method using standard Microsoft Excel®. There is a web site from which the example Excel spreadsheets can be downloaded, but I recommend following the clear instructions to create these spreadsheets to improve comprehension of the methods. Users enter the spreadsheet formulation and solve the problem quickly, then are enticed to change aspects of the formulation (e.g. growth rates or objective definitions) to see the effects of these changes on the solution. Each chapter includes a set of problems to enhance understanding through hands-on manipulation of the problem formulation, and a companion instructor's manual — *Problems and Answers for Decision Methods for Forest Resource Management* — is available. However, I found sufficient enticement to 'play' with the various problems as a natural consequence of successfully formulating and running the original examples.

Each chapter also includes an annotated references section (including references to SPECTRUM and other custom-designed and sophisticated decision-support packages). This section points readers to a wide selection of publications where the method under discussion has been used in a variety of contexts, or an aspect of the method's strength or weakness is highlighted. Senior students or planning professionals who need further insights into the methods will benefit greatly from these suggested sources.

In 2003, I used Excel and the problem formulation suggested in this textbook instead of customised linear programming packages (e.g. LINDO or SPECTRUM) for a senior student planning exercise at the Australian National University (see Turner (1986) for further details on the type of planning exercise). Evidence from student reports and oral defence of their management plans allowed me to conclude that the hands-on approach with Excel-based models resulted in improved student understanding, especially about the strengths and weaknesses of linear programming as a planning tool and the importance of the underlying inventory and growth information. This approach overcame one of the problems identified by Turner (1986) who states that earlier students felt there was a problem in their learning if they 'were not involved in the actual data input facet of the exercise'. This involvement was very difficult, particularly because of the complex modelling/management packages used. However, the 2003 student exercise also identified problems with using Excel for real-world planning problems: the size of the problem (more than 300 decision variables) pushed Excel beyond its anticipated range, often with unreliable and surprising consequences.

Readers should use Excel and the excellent textbook by Buongiorno and Gilless to enhance their understanding of important decision support tools, but not necessarily replace existing decision-support packages.

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Reference

Turner, B.J. (1986) Multiple-use forest planning: a student project. *Australian Forestry* **49**, 203–209.