

have been very difficult to decide what variation to acknowledge in each instance. This, coupled with somewhat nebulous objectives, has resulted almost inevitably in the proliferation of types. Over forty types are shown on the set of maps under review, many of which are distinguished by the presence or absence of a single species. For example, one may have to search several acres to find a northern rata in order to distinguish M2 (matai, rimu, tawa) from M3 (matai, rimu, tawa, northern rata). A greater restriction of forest groupings would have facilitated recognition of the subdivisions in the field, and the classification would, we believe, have still remained broad enough for general use.

We would be failing in our duty if we omitted to point out that subjective methods of classification are now rapidly being replaced by mathematically-based techniques. Although these techniques were beginning to appear in world literature a decade ago, the full impact of them could not have been foreseen at the time.

To summarize, we applaud wholeheartedly the very fine achievement manifested in this set of high quality maps, but we have some regrets that for a land area managed primarily for conservation their value favours timber stand assessment at the expense of watershed protection or ecology.

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AN OUTLINE OF FOREST MENSURATION, WITH SPECIAL REFERENCE TO AUSTRALIA, by L. T. Carron, 1968, Australian National University Press, Canberra. Price \$6.00.

In the preface to his book, Dr Carron explains that it is aimed at filling the need for a reference of Australian mensurational practice, and that the text is intended not to replace but as a background to practical instruction at undergraduate level in the forest. I have read *An Outline of Forest Mensuration* with this uppermost in mind, but was disappointed to find that the author has not really fulfilled his intent.

The book begins with basic definitions of various measurements. It then deals with methods of characterizing individual logs and trees, and growth of the latter; continues with stand, as distinct from tree, variables; and concludes with a chapter on forest inventory. There are about 270 references to other publications, but an index of less than two pages. The chapters are concise, their sequence logical, with little repetition from one to another, and it is easy to locate any given topic.

Dr Carron introduces the subject matter for each topic very well. It was pleasing to note his careful choice of words, so that those often carelessly interchanged, such as precision and bias (or accuracy), shape and taper, growth and increment, etc., are clearly distinguished. Unfortunately, however, he himself confuses site and crop quality. Thus, while climatic, edaphic and other environmental factors can be used to define the inherent capabilities of a site, measurement of production

on age of a crop pertains to that one crop in its given circumstances. One must not judge site quality of an area on the evidence given by an unsuitable crop. This unfortunate terminology may be standard in Australia (it is commonly used in New Zealand, too), but it is certainly unfair to accord it also to the British Forestry Commission Yield Tables (page 162).

In his early chapters, the author has much sound advice to impart, but it may not be given sufficient emphasis and prominence. I fully support Dr Carron's thesis that, if data are to be collected, then let them be based on objective measurements, conscientiously taken at representative points. I particularly welcome the stress he places on good measurement of volume on individual trees, on the linking of physiology and mensuration to promote better measuring, on the difficulty of getting representative bark measurements and on his recommendation that a single point of measurement for breast height should be mandatory.

In the second half of his book, Dr Carron is less successful in explaining how to manipulate good data. He raises too many problems and leaves them unanswered. Often, he covers techniques simply by quoting chapter and verse of a pertinent textbook or article, without critically reviewing their methodology and potential applicability. Readers without ready access to a good forestry library will find this irksome. Possibly Dr Carron has tried to mention too many techniques that he himself would not recommend in practice. Foresters would have benefited from a summary of conclusions that Dr Carron could have drawn from his own wide experience.

Australian experience with strip sampling (pages 189-91) made good reading, as did a comparison of estimates of increment of a sample plot of *Pinus radiata* (pages 150-7); but these were among the very few live examples given, and even they were not fully analysed. More in this vein would have made this book more enjoyable.

It is difficult to understand why no mention is made of the work of Beekhuis in New Zealand, when discussing either yield tables or stand volume formulae for *Pinus radiata*. There are other omissions which I regret, the most important being the omission of even a reference to the standard IUFRO mensurational symbolism.

There is one notable instance where the author may be misinforming his readers. In constructing a volume-basal area line, it is bad practice to use a volume table estimate instead of a volume directly obtained, but it makes matters even worse to suggest that some compensation can be made by taking more samples (page 99). On the contrary, use of volume table estimates actually *reduces* the variation about a volume line, because variation within a given basal area class is already reduced by the equation or table; moreover, one can never hope to compensate for possible bias, in applying a table or equation to a sub-population, by taking more samples.

Other minor errors are that predominant mean height or other such stand height has virtually replaced mean top height in New Zealand practice (page 87), which also measures breast

height on sloping ground on the highest side of the tree (page 17). Also, the proof given of the angle count theory is not strictly correct, and comprehension of it is made difficult by calling the vane on an angle-gauge a "length of material,  $2L$ ".

The book is very clearly printed, but the ends of the lines are not vertically aligned, and this, together with the binding of low quality, detracts from its appearance. The editing is of a reasonably high standard, but the use of "in" instead of "in." several times on pages 150, 151, and 153 puzzled me quite a bit.

The value of this book to foresters lies in the simple but important message that current mensurational practices should be critically examined before far-reaching management decisions are made. Foresters will not always find either remedies or better alternative practices in Dr Carron's book; but if they will carefully digest what he says, and if they are stimulated by him to review their own current mensurational practices (as they should be), then the book will serve a very useful purpose.

A. G. D. WHYTE

THE ECONOMICS OF FORESTRY WITH PARTICULAR REFERENCE TO POLICY AND MANAGEMENT. Papers Presented at a Foresters' School. August, 1968. University of New England, N.S.W., 117 pp. Price A\$1.20.

The fourteen papers published here cover many aspects of forest management which are of equal interest in New Zealand, ranging from land use, methods of economic evaluation, end-use requirements, silviculture, to trade and policy. They are of high standard, and the volume could well be read by many forest managers here.

The papers which the reader will turn to first — because of his natural interests — are juxtaposed with those of associated fields which might otherwise be missed if they were published separately. In this way a silviculturist keeping tabs on Lewis (and all ought to) will be led via a solid demonstration by Lugton of Faustman technique (vindicated by economist Dillon) to the newer ideas of critical path analysis and simulation presented by Turner, exemplified by Curtin by an analysis of thinning.

Students should be grateful for the large number of examples of forest economics calculation presented. The tables of statistical data are equally useful and much material is drawn together here which is otherwise scattered or sometimes unavailable.

The case for New Zealand's share of the Australian market is strongly presented in Thomson's paper, but there are signs in Yoho's summary that Australia is altering its target of self-sufficiency. There are signs that in 2010 self-sufficiency may be more than attained. It is difficult to work out from Jacobs' paper whether the high *per capita* sawnwood consumption of 200 bd. ft projected for 2000 A.D. has been reduced or not. Henry's paper implies that it still stands, but 120 bd. ft is