

2799

YALE UNIVERSITY : SCHOOL OF FORESTRY

BULLETIN No. 67



INVESTMENT THEORY AND
FOREST MANAGEMENT PLANNING

By

BARNEY DOWDLE

Assistant Professor of Forest Economics

University of Washington

NEW HAVEN : YALE UNIVERSITY

1962

CONTENTS

	<i>Page</i>
INTRODUCTION	1
THEORETICAL OBJECTIVES IN FOREST MANAGEMENT	6
Theoretical Optimum Defined	6
Concepts of Maximization	7
Determining Optimum Level of Investment	9
Assumptions Underlying Marginal Theories of Investment	9
Reality of Assumptions	10
Allowances for Uncertainty	12
The Markowitz EV Rule for Analyzing Investment Alternatives	15
A Hypothetical Example of the EV Rule	17
INFORMATION REQUIREMENTS AND INVESTMENT THEORY	20
The Cost of Information	20
Concept of Merchantability Ambiguous in Forest Management	22
Other Considerations in Forest Management	22
Biological Information	23
Concept of "Sound" Forest Management is Dynamic	25
Product Demand and Stumpage Prices	26
STUMPAGE PRICE ESTIMATION	29
Two Methods of Obtaining Stumpage Price Estimates	29
Discrepancies Between Appraised and Actual Stumpage Prices	31
Justification for Use of Conversion Return in Analyzing Forestry Investments	32
EMPIRICAL APPLICATION OF THE EXPECTED RETURNS— VARIATION OF RETURNS INVESTMENT GUIDE	36
Data Sources	36
Relationship Between Net-Realization Value and Tree Size	38
Assumptions Necessary to Apply Relationships Between Tree Size and Net-Realization Value to Management Planning over Time	43
Relationship Between Tree Size and Age	45
Relationship Between Age and Expected Net-Realization Value	46
Determination of Planned Timber Cutting Age	51
Variation in Net-Realization Value a Stumpage Buyer's Risk	54
SUMMARY AND CONCLUSIONS	56
LITERATURE CITED	61

INVESTMENT THEORY AND FOREST MANAGEMENT PLANNING

INTRODUCTION

SIGNIFICANT progress has been made in recent years in adapting the principles of sustained-yield management to forest lands. As virgin timber stands become exhausted, however, and demand for wood products continues to increase, wood-using industries will become even more dependent on timber produced from forest lands managed on a continuous and systematic basis. Since forest land management is primarily an investment undertaking, it is not surprising that these trends have resulted in increased attention being focused on forestry investment analysis. Thus, the concepts of "financial maturity" (Duerr, 1956), "forestry programming" (Stoltenberg, 1959), and "capital budgeting" (Fedkiw, 1960) have been recently introduced into the literature as possible methods for rating forestry investment alternatives.

A common characteristic of these recent theoretical proposals, as with the "soil rent" doctrine that has been widely discussed in forestry literature for nearly a century, is the use of maximum discounted net worth as the guiding rule in making forestry investments. The forestry investor is envisaged as ranking the investment opportunities available to him on the basis of their prospective profitability, and allocating his investment funds accordingly. Nonforestry investment opportunities are included in making these comparisons.

The practical and technical difficulties in applying the concept of maximum discounted net worth to the allocation of investment funds in forest management have been generally recognized. In particular, the time element in timber production necessitates the use of price and demand projections many years into the future. Estimates based on these projections are thus very uncertain. In addition, the heterogeneity of forest land productivity and the species structure of many timber stands complicate the task of predicting physical yields of timber crops under various forest management systems. As a consequence, individual judgment will often play a more important role in making a forestry investment decision than discounted net worth calculations.

While ranking discounted-net-worth estimates may provide the best single criterion for comparing forestry investment alternatives, it does not provide an unequivocal investment guide to the forest land manager. Uncertainty of future economic conditions, variability in physical-yield estimates, and other informa-