

AMERICAN
FORESTRY SERIES

THE AMERICAN FORESTRY SERIES
WALTER MULFORD, CONSULTING EDITOR

Allen—

AN INTRODUCTION TO AMERICAN FORESTRY

Baker—

PRINCIPLES OF SILVICULTURE

THE THEORY AND PRACTICE OF SILVICULTURE

Boyce—

FOREST PATHOLOGY

Brown, Panshin, and Forsaith—

TEXTBOOK OF WOOD TECHNOLOGY, VOLUME I

Bruce and Schumacher—

FOREST MENSURATION

Chapman and Meyer—

FOREST MENSURATION

FOREST VALUATION

Clawson—

THE WESTERN RANGE LIVESTOCK INDUSTRY

Doane, Van Dyke, Chamberlin, and Burke—

FOREST INSECTS

Guise—

THE MANAGEMENT OF FARM WOODLANDS

Harlow and Harrar—

TEXTBOOK OF DENDROLOGY

Kittredge—

FOREST INFLUENCES

Marquis—

ECONOMICS OF PRIVATE FORESTRY

Matthews—

COST CONTROL IN THE LOGGING INDUSTRY

MANAGEMENT OF AMERICAN FORESTS

Panshin, Harrar, Baker, and Proctor—

FOREST PRODUCTS

Preston—

FARM WOOD CROPS

Stoddart and Smith—

RANGE MANAGEMENT

Trippensee—

WILDLIFE MANAGEMENT

Wackerman—

HARVESTING TIMBER CROPS

PRINCIPLES OF SILVICULTURE



FREDERICK S. BAKER, F.E.

*Professor of Forestry
University of California*

FIRST EDITION

NEW YORK TORONTO LONDON
McGRAW-HILL BOOK COMPANY, INC.

1950

FOREWORD

The old practice of philosophizing in technical publications is no longer in fashion. But a hundred years and more ago a German forester, Heinrich Cotta, succeeded so well in expressing some basic truths about silviculture that the student of today can profitably take to heart many of his wise words. The preface to his book "Anweisung zum Waldbau" ("Advice on Silviculture," 1816), translated by Dr. B. E. Fernow, was used to introduce the *Forestry Quarterly* in 1902. It runs as follows:

"If the inhabitants of Germany should leave their country it would be all grown up with woods within a century. Since there would be nobody to use them, the soil would be enriched and the woods would not only increase in size, but in productive power. If, however, the people returned again and made just as large drafts as before for wood, litter and pasturage, the woodlands, even with the best forest management, would again not only be reduced in size, but also become less fertile.

"Forests form and thrive best where there are no people—and hence no forestry, and those are perfectly justified who say: Formerly we had no forestry science and enough wood; now we have that science, but no wood.

"One could say with the same justice: Those people are healthier who do not need a physician than those who do. But it would not follow that the physicians are to be blamed for the diseases. There would be no physicians if there were no diseases, and no forestry science without deficiency in wood supplies. This science is only a child of necessity or need, and need is therefore its natural concomitant; hence the phrase should be: We have now a forestry science because we have a dearth of wood.

"Forestry, however, does not offer any nostrums and can do nothing against the course of nature. The celebrated physician Verdey said: 'The good physician lets people die; the poor one kills them.' With the same right one can say the good forester allows the most perfect forests to become less so; the poor one spoils them. That is to say, just as the good physician cannot hinder that men die because that is the course of nature, so the best forester cannot hinder that the forests, which came to us from past times, become less now they are being utilized.

"Germany formerly contained immense, perfect, most fertile forests. But the large forests have become small, the fertile have become sterile.

CONTENTS

FOREWORD	v
PREFACE	ix
1. INTRODUCTION	1
Silvics and silviculture.	
2. FORESTS IN GENERAL: THEIR FORM AND COMPOSITION	4
The forest: its definition and character—Classifications of forests by origin—Species composition—pure and mixed stands—Even- and uneven-aged stands—Classification according to objects of management.	
3. ECOLOGICAL CLASSIFICATIONS OF FORESTS	22
Major forest formations of the world—Forest regions of the United States—Forest types—Forest regions and climatic provinces—Successional classification—Finnish forest "types."	
4. CLASSIFICATION BY SITE QUALITY AND DENSITY	48
Site Quality—Density—Growing space.	
5. TOLERANCE AND CROWN CLASSES	60
General definitions—Tolerant and intolerant trees—Crown and tree classes.	
6. WATER SUPPLY OF THE FOREST	79
The water cycle—Water supply of forests—Rainfall characteristics of forest regions—Control of soil moisture through silviculture.	
7. UTILIZATION OF WATER BY THE FOREST	106
Water within the plant—Water stored in dead tissues—Drought resistance of plants—Water requirement of plants.	
8. THE PHOTOSYNTHETIC PROCESS	125
Photosynthesis and respiration—Light and photosynthesis—The diurnal pattern of photosynthesis—The nature of tolerance in forest trees.—Return of carbon dioxide to the atmosphere.	
9. NITROGEN AND MINERAL NUTRITION (FOREST SOILS)	151
Forest soils—The nitrogen cycle—The mineral cycle.	
10. PRODUCTION OF SEED	182
Seed supply and forest reproduction—Physiology of seed production—Silvicultural problems of seed production.	
11. DISSEMINATION OF SEED	208
Chief means of seed dissemination of American timber trees—Dissemination of seeds by wind—Dissemination by factors other than wind.	