

CONTENTS

- List of Illustrations / *xi*
- Preface / *xvii*
- Acknowledgments / *xix*

CHAPTER 1

Perceptions of Tropical Forests and Natural Regeneration / 1

- 1.1 Viewing Forests as a Cycle / 1
- 1.2 The Resilience of Tropical Forests / 4
- 1.3 Forest Regeneration, Succession, and Forest Degradation / 5
- 1.4 The Geographic Extent of Deforestation and Forest Regeneration across the Tropics / 7
- 1.5 The Tropical Forests of the Future / 10

CHAPTER 2

Ancient Human Legacies in Tropical Forest Landscapes / 12

- 2.1 Overview / 12
- 2.2 The Peopling of the Tropics / 14
- 2.3 Impacts of Early Hunter-Gatherer Societies / 16
- 2.4 The Development of Agriculture / 21
- 2.5 Holocene Climate Variability, Forest Change, and Agricultural Expansion / 28
- 2.6 Conclusion / 32

CHAPTER 3

Landscape Transformation and Tropical Forest Regeneration through Prehistory / 33

- 3.1 Overview / 33
- 3.2 Earthworks and Landscape Transformations / 33
- 3.3 Prehistoric Fires: Synergies between Natural and Human Causes / 40
- 3.4 Ancient Soil Modifications / 44
- 3.5 The Scale of Prehistoric Human Impacts in the Neotropics / 47
- 3.6 Paleoecological Reconstruction of Tropical Forest Regeneration / 50
- 3.7 Conclusion / 53

CHAPTER 4

Tropical Forest Dynamics and Disturbance Regimes / 55

- 4.1 Overview / 55
- 4.2 Disturbance Regimes in Tropical Forest Regions / 56
- 4.3 Gap Dynamics and the Forest Growth Cycle / 61
- 4.4 Detection of Historical Tropical Forest Disturbance / 65
- 4.5 Are Old-Growth Tropical Forests Stable? / 69
- 4.6 Conclusion / 72

CHAPTER 5

Successional Pathways and Forest Transformations / 73

- 5.1 Overview / 73
- 5.2 Variability in Successional Pathways / 74
- 5.3 Successional Stages and Species Classification / 76
- 5.4 Forest Definitions and Concepts / 88
- 5.5 Approaches to Studying Tropical Forest Succession / 91
- 5.6 Conclusion / 95

CHAPTER 6

Tropical Forest Succession on Newly Created Substrates / 97

- 6.1 Overview / 97
- 6.2 Biological Legacies and Local Resource Availability / 98
- 6.3 Colonization and Succession on Landslides / 101
- 6.4 Succession following Volcanic Eruptions / 103
- 6.5 Riverbank Succession / 107
- 6.6 Conclusion / 110

CHAPTER 7

Forest Regeneration following Agricultural Land Uses / 111

- 7.1 Overview / 111
- 7.2 Effects of Land Use and Biological Legacies on Propagule Availability and Modes of Regeneration / 113
- 7.3 Effects of Land Use on Site Quality and Resource Availability / 120
- 7.4 Conclusion / 126

CHAPTER 8

Forest Regeneration following Hurricanes and Fires / 127

- 8.1 Overview / 127
- 8.2 Hurricane Damage and Regeneration / 129
- 8.3 Tropical Forest Regeneration after Single and Recurrent Fires / 136
- 8.4 Conclusion / 145

CHAPTER 9

Forest Regeneration following Selective Logging and

Land-Use Synergisms / 146

- 9.1 Overview / 146
- 9.2 Harvesting Intensity, Forest Disturbance, and Postlogging Forest Regeneration / 148
- 9.3 Effects of Logging on Animal Abundance and Diversity / 155
- 9.4 Consequences of Land-Use Synergisms for Forest Regeneration / 159
- 9.5 Conclusion / 162

CHAPTER 10

Functional Traits and Community Assembly during

Secondary Succession / 167

- 10.1 Overview / 167
- 10.2 Environmental Gradients during Succession / 170
- 10.3 Successional Changes in Life-Form Composition / 172
- 10.4 Functional Traits of Early and Late Successional Species / 175
- 10.5 Environmental Filtering, Functional Diversity, and Community Assembly during Succession / 185
- 10.6 A General Scheme for Community Assembly during Secondary Succession / 192
- 10.7 Conclusion / 194

CHAPTER 11

Recovery of Ecosystem Functions during Forest Regeneration / 196

- 11.1 Overview / 196
- 11.2 Loss of Nutrients and Carbon during Conversion of Forest to Agriculture / 198
- 11.3 Accumulation of Carbon and Nutrients during Forest Regeneration / 206
- 11.4 Nutrient Cycling and Nutrient Limitation / 213
- 11.5 Hydrology and Water Balance / 216
- 11.6 Conclusion / 217

CHAPTER 12

Animal Diversity and Plant-Animal Interactions in

Regenerating Forests / 219

- 12.1 Overview / 219
- 12.2 Animal Diversity in Regenerating Forests / 225
- 12.3 Plant-Herbivore Interactions during Forest Regeneration / 232
- 12.4 Seed Dispersal and Predation during Forest Regeneration / 234

12.5 Pollination in Regenerating Forests / 241

12.6 Conclusion / 243

CHAPTER 13

Tropical Reforestation Pathways / 245

13.1 Overview / 245

13.2 Reforestation Goals and Decisions / 246

13.3 Reforestation through Management of Forest Fallows / 256

13.4 Ecological Forest Restoration in the Tropics / 259

13.5 Recovery of Biodiversity during Reforestation / 268

13.6 Recovery of Ecosystem Properties during Forest Restoration / 270

13.7 Conclusion / 272

CHAPTER 14

Regenerating Forests in Tropical Landscapes / 274

14.1 Overview / 274

14.2 Land-Use Transitions and Forest Transitions / 278

14.3 The Landscape Context of Forest Regeneration / 279

14.4 Socioecological Drivers of Tropical Reforestation / 284

14.5 Enhancing Forest Regeneration and Human Livelihoods
in the Landscape Matrix / 294

14.6 Conclusion / 302

CHAPTER 15

Synthesis: The Promise of Tropical Forest Regeneration in an Age of Deforestation / 304

15.1 The Power of Forest Regeneration / 304

15.2 Tropical Forest Change and Resilience / 306

15.3 The Current and Future Value of Regenerating Tropical Forests / 309

15.4 New Approaches to Promoting Forest Regeneration / 314

References / 317

Index / 429