

# Contents

Foreword	xi
Acknowledgments	xv
Abbreviations and Acronyms	xvii
<b>Overview</b>	<b>1</b>
Why Are Tropical Forests a Concern?	1
This Report's Aims, Audience, and Scope	2
This Report's Arguments and Structure	5
<b>Setting the Stage: Two Contrasting Cases of Poverty, Wealth, Biodiversity, and Deforestation</b>	<b>19</b>
Poverty, Biodiversity Loss, and Deforestation in Madagascar	19
Wealth, Biodiversity Loss, and Deforestation in Brazil's <i>Cerrado</i>	21
<b>Part I: The Where and Why of Deforestation and Forest Poverty</b>	<b>25</b>
<b>1. Forests Differ</b>	<b>27</b>
Three Stylized Forest Types	27
From Stylized Types to Mapped Domains	31
The Uneven Distribution of Forest Populations	37
Trends in Forest Change	40
Threatened Species—Concentrated in Less-remote Areas and Mosaiclands	47
Summary	50

<b>2. Incentives and Constraints Shape Forest Outcomes</b>	<b>53</b>
The View from the Forest Plot: Comparing the Returns to Forestry and Agriculture	54
How Do Agroclimate, Prices, Technology, Tenure, and Other Factors Affect Deforestation and Income?	60
Forest Trajectories: Roads, Markets, and Rights Shape Outcomes for Environment and Income	71
Summary	78
<b>3. Poverty in Forests Stems from Remoteness and Lack of Rights</b>	<b>81</b>
Poverty Rates and Poverty Density: Two Ways of Viewing Poor Areas	82
Remote Forests—High Poverty Rates, Low Poverty Densities	84
Incomes of Forest Dwellers Depend on Rights and Access to Forestlands	88
Forests, Poverty, and Deforestation: Ambiguous Relationships	93
Summary	104
<b>4. Deforestation Imposes Geographically Varied Environmental Damages</b>	<b>109</b>
Biodiversity Loss—A Local and Global Concern	110
How Does Deforestation Affect Water, Air, and Weather?	115
Deforestation Spurs Climate Change	125
Forest Loss—Sometimes Irreversible	129
Summary	131
<b>Part II: Institutional and Policy Responses</b>	<b>135</b>
<b>5. Improving Forest Governance</b>	<b>137</b>
Who Should Have Rights over Forests? Which Rights?	137
How Should Society Balance Environmental Services against Production of Food, Fiber, and Wood?	137
Balancing Interests while Enforcing Commitments	139
Catalytic Innovations in Institutions and Technology	140
Summary	150

<b>6. Local and National Policies: Framing Rights and Incentives for Forest Management</b>	<b>153</b>
The Challenge of Forest Conflict	154
Forest Rights and Restrictions—A Range of Possibilities	155
Public Management of Forests: Protected Areas and Concessions	161
Community Control of Forests—Balancing Rights and Responsibilities	171
Private Property—Especially in Mosaiclands	178
Other Development Policies with Forest Spillovers	188
Summary	193
<b>7. Mobilizing Global Interests for Forest Conservation</b>	<b>195</b>
Forest Carbon Finance: An Ungrasped Opportunity	195
Why Carbon Finance Makes Sense for Climate	196
Why Carbon Finance Makes Sense for Forests and Rural Development	196
Financing Avoided Deforestation: Problems and Solutions	197
Implementing Incentives for Avoided Deforestation	203
Related Opportunities for Biodiversity Conservation	209
Summary	209
<b>8. Conclusions and Recommendations</b>	<b>211</b>
International Level	213
National Level	215
Accelerating the Forest Transition	218
<b>Appendix A: Tables</b>	<b>220</b>
A.1 Findings of Studies Assessing How Road Proximity Affects Deforestation	220
A.2 Findings of Studies on How Roads Affect Development	230
A.3 Forest Management and Tenure	236
<b>Appendix B: Data and Methods</b>	<b>240</b>
<b>References</b>	<b>247</b>
<b>Index</b>	<b>277</b>

## Boxes

1	Unreliable Generalizations about Deforestation and Poverty	3
2	The World Bank's Forest Strategy	5
3	This Report's Recommendations	17
1.1	This Report's Geographic Scope	28
1.2	Mapping the Domains and Tallying Their Populations	37
2.1	The Forest Transition	77
4.1	Forest Fragmentation Can Trigger Local Ecological Collapse	114
4.2	Trees and Carbon: Lessons from Biology for Forest Policy	127
6.1	Cameroon: A Nexus of Institutional Reform	168
6.2	Self-assembling Biodiversity Corridors: Reconciling Voluntary Participation Decisions with Landscape-level Goals	186
8.1	This Report's Recommendations	212

## Figures

1	Structure of This Report's Arguments	6
1.1	Forests Vary Greatly in Population Density, 2000	41
1.2	Africa and Latin America Have Higher Degradation on Better Soils, 1990–2000	46
1.3	The Incidence of Threatened Amphibian Species Is Much Higher in Nonremote Areas	48
1.4	Imminent Extinction Sites Are Concentrated Near Cities	49
2.1	Deforestation in Brazilian Amazônia Is Shaped by Rainfall and Farmgate Prices of Beef, 2001–03	63
2.2	A Stylized Model of How Land Use Changes with Remoteness	72
2.3	As Remoteness Increases, Mosaiclands Are Displaced by Forests, 2000	73
3.1	Extreme Rural Poverty Increases with Travel Time to Managua	85
3.2	Rural Population Density Decreases with Travel Time to Managua	86
3.3	Forest Cover Increases with Travel Time to Managua	86
3.4	Most Deforestation in Brazilian Amazônia Reflects Large- and Medium-scale Clearing, August 2000 to July 2003	95

3.5	Illiteracy and Forest Cover Have No Clear Link in India	99
4.1	Guatemala Critical Watersheds Have High Poverty Rates	121
4.2	Deforestation Would Be Unprofitable in Many Land Systems at Modest Carbon Prices	129
5.1	Optimizing the Mix of Agricultural Output and Biodiversity	138
5.2	Indonesians Favor Some Restrictions on Forest Exploitation	142
6.1	Protected Areas Have Grown Rapidly in Tropical and Subtropical Forests	162
6.2	Recent Decades Have Seen Little Change in the Remoteness of New Protected Areas	166
8.1	Some Forested Countries Will See Shrinking Rural Populations	219

## Maps

1.1	This Report's Focus: Tropical Forests and Savanna Woodlands	28
1.2	Domains in Africa's Tropical Forest Biomes	32
1.3	Domains in Africa's Tropical Savanna Biomes	33
1.4	Domains in Asia's Tropical Forest Biomes	34
1.5	Domains in Latin American and Caribbean Tropical Forest Biomes	35
1.6	Domains in Latin American and Caribbean Tropical Savanna Biomes	36
1.7	Hotspots of Tropical Deforestation	44
1.8	Imminent Extinction Hotspots	48
3.1a	Poverty Rates for Brazil	82
3.1b	Poverty Densities for Brazil	83
3.2	Amazônian Deforestation 2000–03 Showing Rates and Predominant Clearing Size	96
3.3	Amazônian Deforestation Rates and Rural Illiteracy Densities	97
3.4	Poverty, Forests, and Deforestation in Kalimantan	102
3.5	Poverty, Forests, and Deforestation in Sulawesi	103
3.6	Forest Cover, Deforestation, and Poverty in Madagascar	105
4.1	Mortality Risks from Landslides	123

## Tables

1	Alternative Bundles of Forest Rights	12
1.2	Stylized Forest Types Have Equivalents in Mapped Domains	32
1.3	Forest Populations and Areas Vary by Continent, Biome, Domain, and Remoteness, 2000	39
1.4	Estimated Annual Deforestation Is Highest in Latin America and Asia, 1990–97	42
1.5	During the 1990s Savannas and Asian Forests Experienced Considerable Degradation	45
2.1	Land Values in Forested Areas Vary Enormously	57
2.2	Predictions of How Changes in Local Variables Will Affect the Environment and Welfare	61
2.3	Five Trajectories of Forest Cover, Income, and Population	76
3.1	How Does Increasing Remoteness from Markets Affect Poverty and the Environment?	85
4.1	Externalities of Deforestation Vary by Location of Source and Impact	132
6.1	Examples of Forest Ownership and Use Restrictions	156
6.2	Integrated Conservation-Development Project Interventions Have a Mixed Record	164
6.3	Latin American Countries Impose Varying Restrictions on Deforestation of Private Property	178
7.1	Policies to Reward Avoided Deforestation Can Have Synergistic Effects	208
A.1	Findings of Studies Assessing How Road Proximity Affects Deforestation	220
A.2	Findings of Studies on How Roads Affect Development	230
A.3	Forest Management and Tenure	236
B.1	GLC2000 Land Cover Categories	241