

Contents

-		0			٠
μ	re	ta	ce	X	ł
	10	iu	cc	-	'

INTRODUCTION 1

Chapter 1	Four Economic	Questions about	Global Warming	3
-----------	---------------	-----------------	-----------------------	---

- 1.0 Introduction 3
- 1.1 Four Questions 4
- 1.2 How Much Pollution Is Too Much? 8
- 1.3 Is Government Up to the Job? 13
- 1.4 How Can We Do Better? 14
- 1.5 Can We Resolve Global Issues? 16
- 1.6 Summary 18

PART I: HOW MUCH POLLUTION IS TOO MUCH? 23

Chapter 2 Ethics and Economics 25

- 2.0 Introduction 25
- 2.1 Utility and Utilitarianism 26
- 2.2 Social Welfare 28
- 2.3 Summary 31

Chapter 3 Pollution and Resource Degradation as Externalities 34

- 3.0 Introduction 34
- 3.1 The Open Access Problem 36
- 3.2 The Public Goods Problem 41
- 3.3 Summary 44

Appendix 3A: Overfishing, ITQs, and Aquaculture 48

Chapter 4 The Efficiency Standard 53 4.0 Introduction 53 53 Efficiency Defined 4.1 Efficient Pollution Levels 56 4.2 Marginals and Totals 60 4.3 62 4.4 The Coase Theorem Introduced Air Pollution Control in Baltimore: Calculating the 4.5 63 Efficient Standard 4.6 The Ethical Basis of the Efficiency Standard 64 4.7 Summary 65 Chapter 5 The Safety Standard 72 5.0 Introduction 72 Defining the Right to Safety 73 5.1 The Safety Standard: Inefficient 75 5.2 The Safety Standard: Not Cost-Effective 76 5.3 The Safety Standard: Regressive? 78 5.4 Siting Hazardous Waste Facilities: Safety versus Efficiency 80 5.5 5.6 Summary 83 88 Chapter 6 Sustainability: A Neoclassical View 88 6.0 Introduction Measuring Sustainability: Net National Welfare 90 6.1 Natural Capital Depreciation 6.2 93 96 6.3 Future Benefits, Costs, and Discounting An Example of Discounting: Lightbulbs 98 6.4 99 6.5 Choosing the "Right" Discount Rate for Pollution Control 6.6 Social Discounting versus Market Discounting 102 6.7 Summary 106 Appendix 6A: Nonrenewable Resource Economics 101 111 117 Chapter 7 Sustainability: An Ecological View 7.0 Introduction 117 7.1 Malthus and Ecological Economics 119 7.2 Measuring Sustainability 122 The Precautionary Principle 124 7.3 7.4 Markets, Governments, and the Environmental Impact Statement 130 The Ecological-Neoclassical Debate in Context 132 7.5 7.6 Summary 134 Appendix 7A: Game Theory and the Safe Minimum Standard 138

CONTENTS VII

Chapter 8	
8.0	Introduction 142
8.1	Use, Option, and Existence Value: Types of
	Nonmarket Benefits 143
8.2	Consumer Surplus, WTP, and WTA: Measuring Benefits 144
8.3	Risk: Assessment and Perception 147
8.4	Measuring Benefits I: Contingent Valuation 150
8.5	Measuring Benefits II: Travel Cost 154
8.6	Measuring Benefits III: Hedonic Regression 156
8.7	The Value of Human Life 156
8.8	Summary 159
	Appendix 8A: WTA and WTP Redux 164
Chapter 9	Measuring the Costs of Environmental Protection 168
9.0	Introduction 168
9.1	Engineering Costs 169
9.2	Productivity Impacts of Regulation 171
9.3	Employment Impacts of Regulation 174
	- in provide the providet the provide the provide the provide the provide the provide the
9.4	Monopoly Costs 180
9.4 9.5	Monopoly Costs 180 General Equilibrium Effects 181
9.4	Monopoly Costs 180
9.4 9.5	Monopoly Costs 180 General Equilibrium Effects 181 Summary 186
9.4 9.5 9.6	Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1
9.4 9.5 9.6 Chapter 1	Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1
9.4 9.5 9.6 Chapter 1 10.0	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193
9.4 9.5 9.6 Chapter 1 10.0 10.1	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 O Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 O Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1 11.0	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 O Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206 Is More Really Better? Consumption and Welfare 212 Introduction 212
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1 11.0 11.1	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206 1 Is More Really Better? Consumption and Welfare 212 Introduction 212 Money and Happiness 213
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1 11.0 11.1 11.2	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206 1 Is More Really Better? Consumption and Welfare 212 Introduction 212 Money and Happiness 213 Social Norms and the Rat Race 214
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1 11.0 11.1	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206 1 Is More Really Better? Consumption and Welfare 212 Introduction 212 Money and Happiness 213 Social Norms and the Rat Race 214 Positional Goods and Consumption Externalities 218
9.4 9.5 9.6 Chapter 1 10.0 10.1 10.2 10.3 10.4 10.5 Chapter 1 11.0 11.1 11.2 11.3	 Monopoly Costs 180 General Equilibrium Effects 181 Summary 186 0 Benefit-Cost in Practice: Implementing the Efficiency Standard 1 Introduction 191 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Lead Standards 193 Doing Benefit-Cost: Landfill Regulation 200 Political Influence in Benefit-Cost 203 Is Benefit-Cost Up to the Job? 205 Summary 206 1 Is More Really Better? Consumption and Welfare 212 Introduction 212 Money and Happiness 213 Social Norms and the Rat Race 214 Positional Goods and Consumption 220

PART III:

PART II: IS GOVERNMENT UP TO THE JOB? 231

Chapter 12 The Political Economy of Environmental Regulation 233	
12.0 Introduction 233	
12.1 The Process of Environmental Regulation 234	
12.2 Regulation under Imperfect Information 236	
12.3 Bureaucratic Discretion and Political Influence 238	
12.4 Who Wins the Influence Game? 240	
12.5 Political Reform of Regulation 243	
12.6 Better Information, More Democracy 245	
12.7 Summary 247	
Chapter 13 An Overview of Environmental Legislation 252	
13.0 Introduction 252	
13.1 Cleaning the Air 253	
13.2 Fishable and Swimmable Waters 257	
13.3 Hazardous Waste Disposal on Land 259	
13.4 Chemicals and Pesticides 263	
13.5 Endangered Species Protection 266	
13.6 Summary 267	
Chapter 14 The Regulatory Record: Achievements and Obstacles 271	
14.0 Introduction 271	
14.1 Accomplishments of Environmental Regulation 271	
14.2 Normative Criticisms of Regulation 275	
14.3 Cost-Effectiveness Criticisms of Regulation 276	
14.4 Beyond Regulation? Promoting Clean Technology 278	
14.5 Summary 281	
Chapter 15 Monitoring and Enforcement 284	
15.0 Introduction 284	
15.1 The Economics of Crime 284	
15.2 The Economics of Punishment 287	
15.3 The Compliance Record 290	
15.4 The Political Economy of Enforcement 291	
15.5 Citizen Enforcement 294	
15.6 Cost-Effective Enforcement 295	
15.7 Summary 295	
HOW CAN WE DO BETTER? 301	
Charter 16 Inserting Bread Berndetion Theory 202	

Chapter 16 Incentive-Based Regulation: Theory 303

- 16.0 Introduction 303
- 16.1 The Cost-Effectiveness Rule 304
- 16.2 IB Regulation and Cost-Effectiveness 308

330

- 16.3 IB Regulation and Technological Progress 311
- 16.4 Potential Problems with IB Regulation 313
- 16.5 Summary 320
 Appendix 16A: Imperfect Regulation in an Uncertain World 324
 Appendix 16B: Incentive-Compatible Regulation

Chapter 17 Incentive-Based Regulation: Practice 336

- 17.0 Introduction 336
- 17.1 Lead and Chlorofluorocarbons 337
- 17.2 Trading Urban Air Pollutants 338
- 17.3 Marketable Permits and Acid Rain 342
- 17.4 Recent U.S. Cap-and-Trade Moves: Mercury and Carbon Dioxide? 346
- 17.5 Carbon Trading in the United States 349
- 17.6 The European Emissions Trading System 351
- 17.7 Pollution Taxes and Their Relatives 353
- 17.8 Summary 357

Chapter 18 Promoting Clean Technology: Theory 362

- 18.0 Introduction 362
- 18.1 Path Dependence and Clean Technology 363
- 18.2 Clean Technology Defined 365
- 18.3 If You're So Smart, Why Aren't You Rich? 368
- 18.4 Picking the Winning Path 372
- 18.5 Promoting Early-Stage Clean Technologies 373
- 18.6 Promoting Late-Stage Clean Technologies 376
- 18.7 Clean Technology: Two Case Studies 380
- 18.8 Summary 384
- Chapter 19 Energy Policy and the Future 391
 - 19.0 Introduction 391
 - 19.1 Technology Options: Electricity and Heat 392
 - 19.2 Policy Options: Electricity and Heat 400
 - 19.3 Technology Options: Transport 405
 - 19.4 Policy Options: Transport 410
 - 19.5 Slowing Global Warming at a Profit? 414
 - 19.6 Summary 417

PART IV: CAN WE RESOLVE GLOBAL ISSUES? 421

Chapter 20 Poverty, Population, and the Environment 423

- 20.0 Introduction 423
- 20.1 Poverty and the Environment 425
- 20.2 The Population Picture in Perspective 429

X CONTENTS

- 20.3 An Economic Approach to Family Size 432
- 20.4 Controlling Population Growth 433
- 20.5 Consumption and the Global Environment 438
- 20.6 Envisioning a Sustainable Future 441
- 20.7 Summary 444

Chapter 21 Environmental Policy in Poor Countries 448

- 21.0 Introduction 448
- 21.1 The Political Economy of Sustainable Development 449
- 21.2 Ending Environmentally Damaging Subsidies 451
- 21.3 Establishing and Enforcing Property Rights 453
- 21.4 Regulatory Approaches 456
- 21.5 Sustainable Technology: Development and Transfer 461
- 21.6 Resource Conservation and Debt Relief 464
- 21.7 Trade and the Environment 469
- 21.8 Summary 474

Chapter 22 The Economics of Global Agreements 480

- 22.0 Introduction 480
- 22.1 Agreements as Public Goods 481
- 22.2 Monitoring and Enforcement 482
- 22.3 The Ozone Layer and Biodiversity 484
- 22.4 Stopping Global Warming: Theory 489
- 22.5 Stopping Global Warming: Reality 493
- 22.6 Summary 495

Selected Web Sites 500

Author Index 503

Subject Index 506