EIGHTH EDITION Environmental CONCINENTS An Introduction



Barry C. Field • Martha K. Field

Environmental Economics

An Introduction

Environmental Economics

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An Introduction

Eighth Edition

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ENVIRONMENTAL ECONOMICS: AN INTRODUCTION, EIGHTH EDITION

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Contents in Brief

SECTION ONE Introduction 1

- **1** What Is Environmental Economics? 2
- **2** The Economy and the Environment 19

SECTION TWO Analytical Tools 39

- **3** Benefits and Costs, Supply and Demand 40
- **4** Markets, Externalities, and Public Goods 60
- **5** The Economics of Environmental Quality 78

SECTION THREE Environmental Analysis 103

- 6 Frameworks of Analysis 104
- **7** Benefit–Cost Analysis: Benefits 126
- 8 Benefit–Cost Analysis: Costs 147

SECTION FOUR Environmental Policy Analysis 165

- **9** Criteria for Evaluating Environmental Policies 166
- **10** Decentralized Policies: Liability Laws, Property Rights, Voluntary Action 177
- **11** Command-and-Control Strategies: The Case of Standards 194

- **12** Incentive-Based Strategies: Environmental Charges and Subsidies 212
- **13** Incentive-Based Strategies: Market Trading Systems 234

SECTION FIVE Environmental Policy in the United States 251

- Federal Water Pollution Control Policy 252
- **15** Federal Air Pollution Control Policy 274
- **16** Federal Policy on Toxic and Hazardous Substances 297
- **17** State and Local Environmental Issues 322

SECTION SIX

Global Environmental Issues 339

- **18** Global Climate Change 340
- **19** International Environmental Agreements 359
- 20 Globalization 379
- 21 Economic Development and the Environment 394

APPENDIX

Abbreviations and Acronyms Used in the Book 415

NAME INDEX 419

SUBJECT INDEX 421



Contents

Preface xix

SECTION ONE INTRODUCTION 1

Chapter 1 What Is Environmental Economics? 2

Economic Analysis 3 The Importance of Incentives 4 Incentives: A Household Example 5 Incentives and Climate Change 7 The Design of Environmental Policy 8 Macroeconomic Questions: **Environment and Growth** 10 Benefit–Cost Analysis 12 Valuing the Environment 14 Environment and Development 14 International Issues 15 Globalization and the Environment 17 Economics and Politics 17 Summary 18

Chapter 2 The Economy and the Environment 19

Natural Resource Economics 20 Basic Terminology 22 The Fundamental Balance 23 The Environment as an Economic and Social Asset 27 Environmental Sustainability 28 *Green GDP 29* Emissions, Ambient Quality, and Damages 31 Types of Pollutants 34 *Cumulative Versus Noncumulative Pollutants 34* Local Versus Regional Versus Global Pollutants 35 Point-Source Versus Nonpoint-Source Pollutants 35 Continuous Versus Episodic Emissions 36 Environmental Damages Not Related to Emissions 36 Summary 37 Questions for Further Discussion 38

SECTION TWO ANALYTICAL TOOLS 39

Chapter 3 Benefits and Costs, Supply and Demand 40

Willingness to Pay 40 Demand 43 Aggregate Demand/Willingness to Pay 45 Benefits 46 Costs 48 Opportunity Cost 48 Private and Social Costs 49 Cost Curves 49 The Shapes of Cost Curves 51 Technology 53 The Equimarginal Principle 54 Marginal Cost and Supply 56 Summary 57 Questions for Further Discussion 58

Chapter 4 Markets, Externalities, and Public Goods 60

Economic Efficiency 61 Efficiency and Equity 63 Markets 63 Markets and Social Efficiency 65 External Costs 66 Open-Access Resources 70 External Benefits 72 Public Goods 73 Summary 75 Questions for Further Discussion 76

Chapter 5

The Economics of Environmental Quality 78

Pollution Control—A General Model 79 Pollution Damages 79 Damage Functions 81 Changes in Damage Functions 83 Damages and Uncertainty 85 Damages and Time 86 Abatement Costs 86 Abatement Cost Functions 87 Changes in Marginal Abatement Cost Functions 90 Aggregate Marginal Abatement Costs 92 The Socially Efficient Level of Emissions 94 Changes in the Efficient Level of Emissions 96 Enforcement Costs 98 The Equimarginal Principle Applied to Emission Reductions 99 Summary 101 Questions for Further Discussion 101

SECTION 3 ENVIRONMENTAL ANALYSIS 103

Chapter 6 Frameworks of Analysis 104

Impact Analysis 104 Environmental Impact Analysis 104 Economic Impact Analysis 105 Regulatory Impact Analysis 105 Cost-Effectiveness Analysis 106 Damage Assessment 107 Benefit–Cost Analysis 108 The Basic Framework 109 Scope of the Program 112 Discounting 113 Choice of Discount Rate 115 Discounting and Future Generations 117 Distributional Issues 118 Risk Analysis 120 Risk Assessment 121 Risk Valuation 121 Risk Management 123 Summary 123 Questions for Further Discussion 124

Chapter 7 Benefit–Cost Analysis: Benefits 126

The Damage Function: Physical Aspects 127 Measuring Damage Costs Directly 128 Health Costs 128 The Effects of Pollution on Production Costs 129 Materials Damage 131 Problems with Direct Damage Approaches 132 Willingness to Pay: Estimating Methods 132 Willingness to Pay: Revealed Preference Methods 133 The Value of Human Health as Expressed in Averting Costs 134 The Value of Human Life as Expressed in Wage Rates 134 Valuing Children's Health 136 The Value of Environmental Quality as Expressed in House Prices 137 The Value of Environmental Quality as Expressed in Travel Costs 139 Willingness to Pay: Stated Preference Methods 139 Valuing an Environmental Amenity 140*CV and Valuing Health Outcomes* 141 Problems of CV Analysis 142

Problems in Benefit Estimation 143 Discounting 143 Willingness to Pay Versus Willingness to Accept 144 Nonuse Values 145
Summary 145
Questions for Further Discussion 146

Chapter 8 Benefit–Cost Analysis: Costs 147

The Cost Perspective: General Issues 147 The With/Without Principle 148 A Word on Social Costs 149 The Distribution of Costs 149 Concepts of Cost 150 Opportunity Costs 150 Environmental Costs 151 Enforcement Costs 151 Costs of Single Facilities 152 Costs of a Local Regulation 153 Costs of Regulating an Industry 155 An Example: BSER 155 Sources of Cost Data 156 Actual Versus Minimum Pollution-Control Costs 157 The Effect of Output Adjustments on Costs 158 Long-Run Technical Change and Pollution-Control Costs 159 Costs of National Regulation 160 Future Costs and Technological Change 163 Summary 164 Questions for Further Discussion 164

SECTION FOUR ENVIRONMENTAL POLICY ANALYSIS 165

Chapter 9 Criteria for Evaluating Environmental Policies 166 Efficiency 166 Cost-Effectiveness 167 Fairness 169 The Idea of "Social" 170 Environmental Justice 170 Enforceability 171 172 Flexibility Incentives for Technological Innovations 173 Materials Balance Issues 174 Moral Considerations 174 Government Failure 175 Summary 176 **Questions for Further** Discussion 176

Chapter 10 Decentralized Policies: Liability Laws, Property Rights, Voluntary Action 177

Liability Laws 177 The Principle 178 Common Law 179 Statutory Law 181 Property Rights 183 The Principle 184 Rules and Conditions 185 Problems with Property Rights to Internalize Externalities 186 Transactions Costs 186 Public Goods 186 Absence of Markets 186 Markets for Green Power 188 Voluntary Action 189 Moral Suasion 189 Informal Community Pressure 191 Summary 192 Questions for Further Discussion 193

Chapter 11 Command-and-Control Strategies: The Case of Standards 194

Types of Standards 195 Ambient Standards 196

Emission Standards 196 Technology Standards 197 Standards Used in Combination 199 The Economics of Standards 199 Setting the Level of the Standard 199 Uniformity of Standards 200 Standards and the Equimarginal Principle 201 Standards and Incentives 204 Political-Economic Aspects of Standards 206 The Economics of Enforcement 207 Enforcing Emission Standards 207 Enforcing Technology Standards 209 The Enforcing Agency 210 Summary 210 Questions for Further Discussion 211

Chapter 12 Incentive-Based Strategies: Environmental Charges and Subsidies 212

Emission Charges or Taxes 213 The Economics of an Emission Tax 214 The Level of the Charge 216 Emission Charges and Cost-Effectiveness 218 Emission Taxes and Nonuniform Emissions 221 Emission Charges and Uncertainty 223 Emission Charges and Tax Revenues 224 Emission Charges and the Incentives to Innovate 226 Emission Charges and Enforcement Costs 227 Other Types of Charges 228 Carbon Taxes 228 Abatement Subsidies 229 Deposit-Refund Systems 230 Summary 232 **Questions for Further** Discussion 233

Chapter 13 Incentive-Based Strategies: Market Trading Systems 234

General Principles 234 Cap-and-Trade 235 The Initial Rights Allocation 238 Establishing Trading Rules 240 Reducing the Number of Permits 240 Nonuniform Emissions 242 CAPs and Problems of Competition 243 CAPs and Enforcement 244 CAPs and Enforcement 244 CAPs and the Incentive for R&D 244 CAPs and Uncertainty 245 Offset Trading 246 Emission Rate Trading 247 Summary 249 Questions for Further Discussion 250

SECTION FIVE ENVIRONMENTAL POLICY IN THE UNITED STATES 251

Chapter 14 Federal Water Pollution Control Policy 252

Types of Water Pollutants 253 Federal Water Policy: A Brief History 255 Technology-Based Effluent Standards 257 TBESs and Cost-Effectiveness 259 TBESs and Incentives 260 TBESs and Enforcement 261 The Municipal Wastewater Treatment Plant Subsidy Program 262 The Safe Drinking Water Act (SDWA) 264 Accident Response: The Case of Oil Spills 266 Nonpoint-Source Water Pollution Control 268 Total Maximum Daily Load (TMDL) Program 269

Emission Trading in Water-Pollution Control 270 Summary 272 Questions for Further Discussion 273

Chapter 15 Federal Air Pollution Control Policy 274

Federal Air Policy: A Brief History 277 National Ambient Air Quality Standards 280 Stationary-Source Control 281 Technology-Based Effluent Standards 283 Differentiated Control 283 Emissions Trading in Stationary-Source Control 285 The CAP Program for Reducing SO₂ Emissions and Acid Rain 286 Controlling Greenhouse Gas Emissions 288 Mobile-Source Air-Pollution Control 288 New-Car Emission Standards 289 Clean Cars 291 Mobile-Source Standards and Climate Change 292 Behavioral Economics Issues 294 Summary 295 296 Questions for Further Discussion

Chapter 16 Federal Policy on Toxic and Hazardous Substances 297

Economic Issues in Laws Governing Chemicals in Production and Consumer Products 299 Regulatory Criteria 299 Differentiated Control: "Old" versus "New" 302 Testing Chemicals and the Burden of Proof 303

Uniform Standards 303 Technological Change in Chemicals 304 Globalization and Chemicals 304 The Economics of Pest Resistance 306 Economic Issues in Federal Policy on Toxics in Water and Air Emissions 306 Instrument Choice 308 Hazardous-Waste Reduction 309 The Management of Hazardous Wastes 311 Economic Issues in Handling Current Hazardous Waste 313 Incentive-Based Possibilities 314 Environmental Justice 315 Radioactive Wastes 316 Economic Issues in Handling Legacy Hazardous-Waste Sites 317 Financing Hazardous-Waste-Site Cleanups 317 How Clean Is Clean? 318 Brownfields 318 Natural Resource Damages 319 Cleaning Up the Nuclear Buildup 320 Summary 320 Questions for Further Discussion 321

Chapter 17 State and Local Environmental Issues 322

Environmental Federalism 323 Constitutional Issues 323 Efficiency Issues 323 Race to the Bottom? 325 Policy Innovations at the State Level 325 Municipal Solid Waste 326 Technical Options for Reducing MSW 327 Policy options for Reducing MSW 328 The Economics of Recycling 329 Producer Use of Recycled Material 331 Consumer Recycling Decisions 333 Producer Take-Back Programs 334 Local Environmental Regulations 335

The Increasing Role of the States 336 Summary 337 Questions for Further Discussion 338

SECTION SIX GLOBAL ENVIRONMENTAL ISSUES 339

Chapter 18 Global Climate Change 340

Global Climate Change 340 The Physical Problem 340 Human and Ecosystem Impacts 342 Scientific Uncertainties and Human Choice 343 Reducing Domestic GHG Emissions 345 Incentive-Based Approaches for Reducing GHG Emissions 347 International Efforts for Addressing Climate Change 349 The Kyoto Protocol 349 The Paris Agreement 350 Estimating the Social Cost of Carbon 352 Economics of Adaptation 353 Biological Diversity 355 Summary 357 Questions for Further Discussion 358

Chapter 19 International Environmental Agreements 359

General Issues 360 The Economics of International Agreements 365 Bilateral Agreements 365 Multilateral Agreements 367 The Distribution of Costs 369 Bargaining Issues 369 Cost-Effectiveness in Multinational Agreements 371 A Multilateral Success Story: The Montreal Protocol 372 The Physical Problem 372 International Response 373 The Economics of CFC Controls 374 Summary 377 Questions for Further Discussion 377

Chapter 20 Globalization 379

Dimensions of Globalization 379 Sorting Out Cause and Effect 380 Trade and the Environment 381 *Free Trade Versus Environmental Trade Restrictions 382* Environmental Implications of Globalization 385 Climate Change and Globalization 386 Regional Trade Agreements 388 *Environmental Trade Restrictions 389* Summary 392 Questions for Further Discussion 393

Chapter 21 Economic Development and the Environment 394

Environmental Degradation in Developing Economies 395 Economic Growth and the Environment 396 A Static View 397 Sustainability 398 Long-Run Relationships 399 Environmental Policy Issues in **Developing Countries** 401 Benefit-Cost Analysis 401 Reducing Environmental Disincentives 403 Institutional Policy: Property Rights 404Population Policy as Environmental Policy 406 Policy Choice in Developing Countries 407

The Paris Agreement and Developing Countries 410 The Role of the Developed Countries 410 Technology Transfer 411 Environmental Values in International Development Banks 412 Summary 413 Questions for Further Discussion 414

APPENDIX

Abbreviations and Acronyms Used in the Book 415

NAME INDEX 419

SUBJECT INDEX 421

Preface

This book is an introduction to environmental economics. It is about the way human decisions affect the quality of the environment, how human values and institutions shape our demands for improvement in the quality of that environment, and, most especially, about how to design effective public policies to bring about these improvements.

Problems of environmental quality are not something new; in fact, history is filled with bleak examples of environmental degradation, from deforestation by ancient peoples to mountains of horse manure in urban areas in the days before automobiles. But today's world is different. For one thing, many people in economically developed countries, having reached high levels of material well-being, are beginning to ask questions: What good is great material wealth if it comes at the cost of large-scale disruptions of the ecosystem by which we are nourished? More fundamental, perhaps, is the fact that with contemporary economic, demographic, and technological developments around the world, the associated environmental repercussions are becoming much more widespread and lethal. What once were localized environmental impacts, easily rectified, have now become widespread effects that may very well turn out to be irreversible. Our most worrisome concern today is global environmental impacts.

It is no wonder, then, that the quality of the natural environment has become a major focus of public concern. As we would expect, people have responded in many ways. Environmental interest groups and advocates have become vocal at every political level, especially in those countries with open political systems. Politicians have taken environmental issues into their agendas; some have sought to become environmental statespersons. Environmental law has burgeoned, becoming a specialty in many law schools. Thousands of environmental agencies have appeared in the public sector, from local conservation commissions to environmental agencies at the United Nations. At the scientific level, environmental problems have become a focus for chemists, biologists, engineers, and many others. And within economics there has developed **environmental economics**, the subject of this book.

Environmental economics focuses on all the different facets of the connection between environmental quality and the economic behavior of individuals and groups of people. There is the fundamental question of how the economic system shapes economic incentives in ways that lead to environmental degradation as well as improvement. There are major problems in measuring the benefits and costs of environmental quality changes, especially intangible ones. There is a set of complicated macroeconomic questions, for example, the connection between economic growth and environmental impacts and the feedback effects of environmental laws on growth. And there are the critical issues of designing environmental policies that are both effective and equitable.

The strength of environmental economics lies in the fact that it is analytical and deals with concepts such as efficiency, trade-offs, costs, and benefits. Many believe

strongly that the times call for more direct political action, more consciousnessraising, more political-organizing, and, especially, more representation and influence of environmental interests on the political scene, essentially more action. Nobody can doubt this. We live in a complicated world, however, where human problems abound; domestically we have health care, drugs, education, violence, and other critical issues, all competing for attention and public resources. Throughout the world, vast numbers of people struggle to alter their political and economic institutions, develop their economies, and raise their material standards of living and well-being.

The first edition of this book was written more than 25 years ago. Much has changed since then. Some of the environmental problems that were important then have been addressed with success, for example, the problem of acid deposition stemming from coal power-plant SO_2 emissions. And significant progress has been made during this time. Cars are much cleaner. Many of our rivers and lakes have better water quality, and less raw sewage flows into water bodies. Emissions of ozone-depleting chemicals have been reduced substantially, and recycling is part of everyday life. These all happened through public policies of various types.

But much remains to be done. People are still impacted by polluted air. The quality of drinking water is a continuing problem for growing urban populations. Episodic events, oil spills, and chemical releases are still common. And we are now faced with a problem of global scale: the transformation of the global climate as a result of modern industrial energy-related emissions. The massive nature of this problem makes the perspective of environmental economics especially relevant.

In these settings, just raising the political heat for environmental issues is not sufficient. We have to get hard scientific results on how people value environmental quality and how they are hurt when this quality is degraded. We also have to put together environmental policy initiatives that get the maximum impact for the economic and political resources spent. This is where environmental economics comes in. It is a way of examining the difficult trade-off types of questions that all environmental issues entail; it is also a valuable means of inquiring why people behave as they do toward the natural environment, and how we might restructure the current system to rectify harmful practices and inspire favorable behavior.

In fact, the subject is important enough to deserve to be widely available to the nonspecialist. Economics has developed a sophisticated body of theory and applied knowledge. Courses in economics now follow a hierarchy of introductoryand intermediate-level principles that are designed to lead students along and prepare them for the more advanced applications courses. But these run the risk of closing off the subject, making it inaccessible to those who do not want to become specialists. This book is intended, instead, for people who have not necessarily had any economics courses, at least not yet. It was written on the assumption that it's possible to present the major principles of economics in a fairly commonsensical, although rigorous, way and then apply them to questions of environmental quality.

The basic structure and sequence of chapters in this edition are unchanged, although we have reorganized and updated the last section on global issues.

The first section of the book is an introduction, beginning with a chapter on what environmental economics is about, followed by one on the basic relationships between the economy and the environment. The next section is devoted to studying the "tools" of analysis, the principles of demand and cost, and the elements of economic efficiency in both market and nonmarket activities. These chapters are not meant to be completely thorough treatments of these theoretical topics; however, given the objective of the book, the introductory chapters are essential. Even those who have had a course in microeconomic principles might find them valuable for purposes of review. Section 2 also contains a chapter in which these economic principles are applied to a simple model of environmental pollution control.

Section 3 is on environmental analysis. Here we look closely at some of the techniques that have been developed by environmental economists to answer some of the fundamental value questions that underlie environmental decision-making. We focus especially on the principles of benefit–cost analysis. After this we move to Section 4, on the principles of environmental policy design. It begins with a short chapter dealing with the criteria we might use to evaluate policies, then moves on to chapters on the main approaches to environmental quality management.

Sections 5 and 6 contain policy chapters, where we examine current developments in environmental policy with the analytical tools developed earlier. Section 5 is devoted to environmental policy in the United States, covering federal policy on water, air, and toxic materials. It also contains a chapter on environmental issues at the state and local levels, including recycling. Finally, the last section looks at international environmental issues: global climate change, the economics of international environmental agreements, globalization, and economic development and the environment.

The eighth edition contains much new material, including new exhibits and updated figures and tables. It also contains new materials on:

•	Paris Agreement	Chapters 18 and 19
•	Economics of Adaptation	Chapter 18
•	Developing Countries and the Paris Agreement	Chapter 21
•	Climate Change and Globalization	Chapter 20
•	Carbon Intensity of Trade	Chapter 20
•	Greenhouse Gas Emissions	Chapter 20
•	Recycling Markets	Chapter 17
•	Frank Lautenberg Chemical Safety for the	-
	21st Century Act	Chapter 16
•	Emission Trading in Water Pollution Control	Chapter 14
•	Income Distribution of Emission Charges	Chapter 12
•	Community Resiliency	Chapter 21
•	Total Maximum Daily Load	Chapter 14

A collection of relevant web links and additional sources is available on the website. Also available is a tutorial for working with graphs. For instructors, the website offers an Instructor's Manual available for easy download. To access the website associated with this book, please see **www.mhhe.com/field8e**.

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This text is the result of teaching the subject for many years in the classroom, so first we want to thank all those students through the years who have listened, asked questions, and provided the feedback that shaped the book. Many people have helped review and shape previous editions of the book. Thanks to John Stranlund, University of Massachusetts Amherst; Stephen Holland, University of North Carolina at Greensboro; Jacqueline Geoghegan, Clark University; Roger H. von Haefen, North Carolina State University; Andrew A. Wilson, University of Virginia; Juliette K. Roddy, University of Michigan–Dearborn; John Peter Tiemstra, Calvin College; Mustafa Sawani, Truman State University; Jennifer Peterson, Doane College; Forrest Stephen Trimby, Worcester State College; Hui Li, Eastern Illinois University; Paul C. Huszar, Colorado State University; John R. Stoll, University of Wisconsin–Green Bay; Richard Claycombe, McDaniel College; and Ellen T. Fitzpatrick, State University of New York, Plattsburgh.

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Barry C. Field Martha K. Field

Section

1

Introduction

This first section contains two introductory chapters. The first is a brief, nontechnical review of some of the main topics and ideas of environmental economics. The second contains a general discussion of the interactions that exist between the economy and the environment, and introduces some fundamental concepts and definitions that are used throughout the book.

Chapter

What Is Environmental Economics?

Economics is the study of how and why individuals and groups make decisions about the use and distribution of valuable human and nonhuman resources. It is not solely the study of profit-making businesses making decisions in a capitalist economy. It is much broader than this; it provides a set of analytical tools that can be used to study any situation in which the scarcity of means requires the balancing of competing objectives. It includes, for example, important questions in the behavior of nonprofit organizations, government agencies, and consumers.

Environmental economics is the application of the principles of economics to the study of how environmental resources are managed. Economics is divided into **microeconomics**, the study of the behavior of individuals and small groups, and **macroeconomics**, the study of the economic performance of economies as a whole. Environmental economics draws from both sides, although more from microeconomics than from macroeconomics. It focuses primarily on how and why people make decisions that have consequences for the natural environment. It is also concerned with how economic institutions and policies can be changed to bring these environmental impacts more into balance with human desires and the needs of the ecosystem itself.

One of our first jobs, therefore, is to become acquainted with some of the basic ideas and analytical tools of microeconomics. To do this at the very beginning, however, would risk giving the impression that the tools are more important than their uses. The tools of analysis are not interesting in themselves, but for the understanding, they can give us about why the natural environment becomes degraded, what the consequences of this are, and what can be done effectively to reduce this degradation. For this reason, the first chapter is devoted to sketching out, in commonsense terms, the kinds of questions environmental economists ask and the kinds of answers they seek. After a brief discussion of some general issues, we look at a series of examples of some of the problems addressed in environmental economics.