

ENVIRONMENTAL ECONOMICS



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Environmental Economics and Natural Resource Management, 2/e

David A. Anderson

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To Donna, Austin, and Ally

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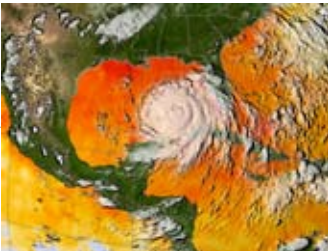
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"We're starting into territory where nobody's tread before as far as cleanup and remediation is concerned. There are more questions than answers."

— Darryl Malek-Wiley of the Sierra Club's
New Orleans office after Hurricane Katrina

Preface

There may be more questions than answers, as the preceding quote suggests, but the tools of environmental economics provide remarkable guidance as we weigh development against nature, present against future, and certain benefits against uncertain consequences. From reluctant-but-necessary calculations of the value of life, to moral dilemmas over profits versus environmental amenities, the consensus findings of economic research are striking and relevant to policy decisions. It turns out that the value of human life is not infinite and the optimal amount of pollution is not zero, but that everyday ignorance of economic wisdom results in behavior that places too little value on life and permits too much pollution. My intent with this textbook is to cover the most enriching environmental topics with a rigorous yet accessible approach. In this second edition I have added new graphs, explanations, photographs, and concepts that I hope will make the learning process all the more effective and enjoyable.

To me, environmental economics stands out among offerings in the college curriculum. Like the Arts, the environment serves as a basis for cultural identity and is a fount for social welfare. As in the natural sciences, students set out to reach a better understanding of vital natural assets. But the study of environmental economics holds added allure because it speaks directly to practices and current policy decisions that might determine our fate. Economics provides the tools with which to specify how much we should pollute, how much we should extract, how much we should tax, and how much we should conserve for the future.

Most people in our society are keenly aware of the debates surrounding natural assets. Few are aware of the costs and benefits of, for example, natural gas as an alternative fuel, or the means by which to weigh short-term costs against long-term benefits. Critical policy is often swayed by emotional arguments on each side of environmental issues. It may be inhuman to be dispassionate, but the tools of economics provide opportunities to displace emotion with more concrete criteria. The challenge, then, is to apply the most valid methodology earnestly and honestly. This text explains relevant techniques and points out temptations for abuse.

Although environmental economics hinges largely on moral and ethical decisions, discussions of right and wrong are seldom introduced in the existing literature. The need for greater global attention to ethical considerations was



punctuated by the terrorism and business corruption of recent years, but ethical stances have long driven society's treatment of the environment. The allocation of scarce resources involves inherent moral dilemmas over the treatment of other humans, wildlife, and future generations of both. This text explains prominent ethical theories and highlights the role of ethics in environmental policy decisions.

In terms of pedagogy, this book teaches with stories, numerical examples, and data from recent empirical studies. The presentation caters to visual learners with a wealth of pictures and diagrams. "Reality checks" in each chapter delve more deeply into the application of economic principles in the real world. Problem sets and Web-surfing challenges are designed to reinforce understanding, and Internet links and suggestions for further reading serve students whose interest has been stirred. The coverage is relatively comprehensive, applied, and policy-oriented.

Economics might not deserve its reputation as the "dismal science," earned by Thomas Malthus and his warnings of impending resource scarcity. There is reason for optimism about the success of planned marriages between economic growth and environmental concerns. To navigate a path of economic growth through sensitive environmental waters will require deliberate practices and policies and a firm understanding of the relevant economics. I hope that this book can be a meaningful first step in that journey.

General Overview

This textbook is divided into three parts. The chapters in the first part introduce the field of environmental economics and provide a detailed review of the more useful tools in the field. Since decisions regarding natural resources cannot escape the realm of ethics, the final chapter in this part provides a foundation of ethical theories. The second part lays out current areas of interest and concern, and explains alternative approaches to problem solving and the attainment of efficiency. Although environmental policy issues appear throughout the text, the third part emphasizes policy measures and issues with close public-sector oversight.

It is my belief that students cannot discuss or apply environmental economics appropriately without adequate knowledge of the underlying concepts and definitions. Without a proper understanding of the food chain, one cannot appreciate the economic value of plankton. Not knowing the meaning of hedonic pricing, one cannot speak intelligently about estimating the value of biodiversity. For this reason, the first section of most chapters contains definitions and perhaps a discussion of chemistry, biology, or government. The alternative would be to assume that readers have taken and remember all of those classes that complement environmental and natural resource economics—an expectation I would not want applied to myself!



Part I Building a Foundation

Chapter 1 The Big Picture

This chapter presents an overview of compelling environmental economics issues and gives students a sketch of what is ahead in the text and why it is of interest. Nine key areas within the field are briefly highlighted: market failure, waste and recycling, environmental ethics, sustainable development, biological diversity, environmental degradation, alternative energy sources, population and economic growth, and natural resources management. Students are enticed with less-than-subtle hints that the forthcoming tools of economics will address each of these issues.

Chapter 2 Efficiency and Choice

This chapter covers the primary tools of economic analysis, explaining marginal analysis, expected value calculations, supply and demand, and consumer choice. It is written as a comprehensive review for students who have seen most of this material in other courses, and to serve as a reference for students who encounter applications of this material later in the text and want to re-read the underlying concepts.

Appendix Efficiency in Greater Detail

The Appendix provides a mathematically rigorous explanation of efficiency criteria.

Chapter 3 Market Failure

This chapter explains why the invisible hand might not always yield an efficient outcome. The sources of market failure—externalities, public goods, imperfect information, and imperfect competition—are explained in detail, including graphical analysis and real-world examples. In addition to foreshadowing the policy solutions of the second section, this chapter presents the Coase Theorem, using numerical examples.

Chapter 4 The Role of Government

Chapter 4 analyzes the role of government in stemming market failure. Discussions address the need for government, the solutions government brings, and some of the pitfalls of both public and private approaches to externalities. The chapter also identifies opportunities to substitute regulation for liability from an efficiency standpoint, and outlines key environmental agencies and legislation.

Chapter 5 Tradeoffs and the Economy

Many of the most difficult questions in our field deal with long run versus short run benefits, and financial versus environmental gains. This chapter explains the tools of discounting and their applications. The chapter then covers methods for weighing economic growth against environmental degradation, and explores prospects for economic growth that are consistent with environmental goals.



Part II Issues and Approaches

Chapter 6 Environmental Quality

This chapter explains measures and determinants of environmental quality, including air quality, water quality, light pollution, and noise pollution. Case studies of solutions include policy, education, technology, product substitution, and market-based incentives. Tradable pollution permits are introduced, and receive more thorough coverage in Chapter 12.

Chapter 7 Energy

This chapter addresses traditional and alternative sources of energy, with attention to the tradeoffs between various options, political and economic barriers, and future prospects. A case study of twenty-first century automotive technology provides a backdrop for discussions of the politics, pawns, and big players in energy-related debates.

Chapter 8 Sustainability

This nebulous but conceptually attractive approach provides a guiding question for every activity that affects the environment: For how long can this activity be sustained? This chapter considers the appropriate application of the sustainability criterion and examines promising opportunities for sustainable development.

Chapter 9 Population, Poverty, and Economic Growth

This chapter covers demographic trends and their relationships to the environment. Past theories, including the work of Malthus and Kuznets, are coupled with more recent perspectives on municipal waste generation and the determinants of resource use. The chapter concludes with a discussion of how current and proposed government policies affecting poverty and economic growth are likely to in turn affect the environment.

Chapter 10 Biodiversity and Valuation

This chapter addresses optimal levels of biodiversity, issues of species prioritization, and the valuation of natural resources. Methods for estimating the marginal value of specific species are explained, with references to the current literature. Topics include the interpretation of market prices, contingent valuation, hedonic pricing, and the travel cost method.

Chapter 11 International and Global Issues

This chapter describes the aspects of environmental economics that transcend national boundaries. It covers attempts at international cooperation and the associated organizations and agreements. Topics include the CITES and Kyoto treaties, global warming, acid rain, natural disasters, global scarcity, poaching, and the strengths and weaknesses of international law.



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Part III Policy and Procedure

Chapter 12 Perspectives on Environmental Policy

Building on the review of marginal analysis in Chapter 2, this chapter explains the application of cost-benefit analysis to major environmental policy initiatives. With an even-handed approach, the chapter presents the concerns of business firms and environmental guardians, discusses the specific marginal gains and losses, and explores the efficient reconciliation of relevant needs and wants. Case studies include the Endangered Species Act and a thorough discussion of tradable emissions permits.

Chapter 13 Natural Resource Management: Renewable Resources

Although many of the chapters in this text pertain to natural resource management, Chapters 13 and 14 have a narrower focus. Chapter 13 introduces a model of renewable resource use that serves as a basis for policy discussions in this and the following chapter.

Chapter 14 Natural Resource Management: Depletable and Replenishable Resources

Models of depletable, recyclable, and renewable resource use appear in a single chapter, in which differences among the treatments can be easily identified and explained. For simplicity and brevity, one representative resource from each group is selected for a case study. Topics include consensus research findings and the optimal size and timing of harvests.

Chapter 15 Environmental Dispute Resolution

The field of environmental economics harbors many an opportunity for dispute. Liberals and conservatives battle over policy. Businesses and communities battle over growth. The owners of resources battle over use, liability, and conflicting ownership claims. How these disputes are resolved often determines the allocation of natural resources and the state of environment preservation. This chapter emphasizes efficient mechanisms for dispute resolution, including “cake-cutting” techniques, mediation, arbitration, and offer-of-settlement devices.

Chapter 16 Morals and Motivation

At the core of many environmental economics debates are moral issues involving the appropriate treatment of flora, fauna, fellow humans, and future generations of all the above. This chapter considers the motives behind our behavior; in essence, the elements of our utility functions. General ethical theories are followed by narrower discussions of deep ecology, social ecology, and ecofeminism. The chapter concludes with several alternative “tests” for whether particular actions that affect the environment are acceptable.



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