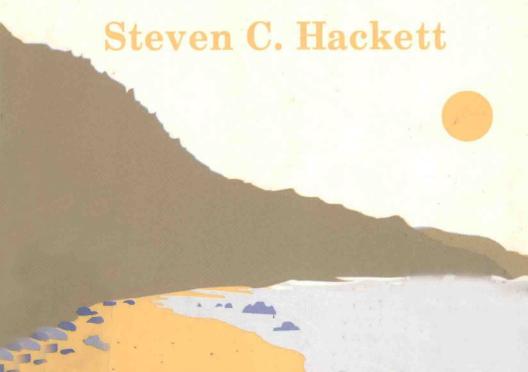


Theory, Policy, and the Sustainable Society



# ENVIRONMENTAL AND NATURAL RESOURCES ECONOMICS

# Theory, Policy, and the Sustainable Society

Steven C. Hackett

M.E. Sharpe
Armonk, New York
London, England

#### Copyright © 1998 by M. E. Sharpe, Inc.

All rights reserved. No part of this book may be reproduced in any form without written permission from the publisher, M. E. Sharpe, Inc., 80 Business Park Drive, Armonk, New York 10504.

#### Library of Congress Cataloging-in-Publication Data

Hackett, Steven C., 1960-

Environmental and natural resources economics: theory, policy, and the sustainable society / Steven C. Hackett.

p. cm.

Includes bibliographical references and index.

ISBN 0-7656-0108-7 (alk. paper). — ISBN 0-7656-0109-5 (pbk. : alk. paper)

Environmental economics. 2. Environmental policy. 3. Natural resources. 4. Sustainable development. I. Title.

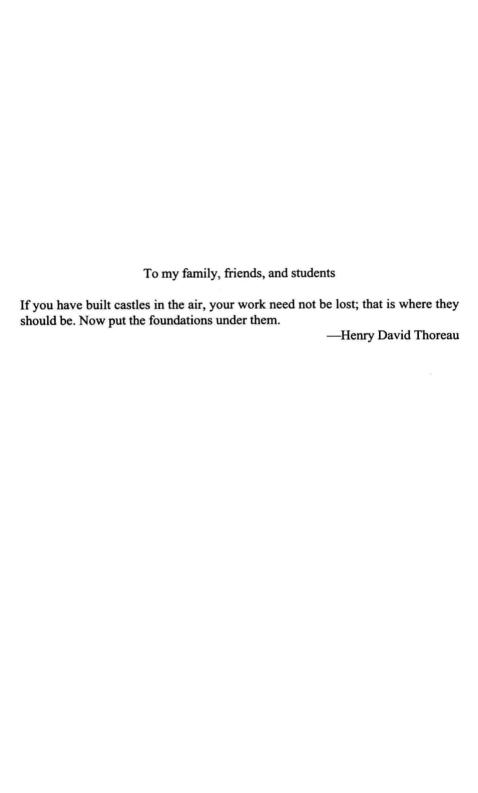
HD75.6.H33 1998 333.7—dc21 97–30753 CIP

#### Printed in the United States of America

The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—
Permanence of Paper for Printed Library Materials,
ANSI Z 39.48-1984.



BM (c)	10	9	8	7	6	5	4	3	2	1
BM (p)	10	9	8	7	6	5	4	3		



### **Preface**

This book introduces some of the concepts, theories, and policies that make up environmental and natural resources economics while also exploring the emerging area of sustainability studies. A number of attributes set this book apart from others on the subject. First, it offers an accessible perspective on environmental and natural resources economics for those readers who are motivated to learn about this important area but who may not necessarily have a great deal of prior academic background in economics. This book also brings a somewhat more multidisciplinary perspective to the subject of environmental and natural resources economics than is typical in other textbooks. Thus the book may be particularly suitable for economics courses taught in multidisciplinary programs such as environmental studies or natural resources planning and interpretation. While the approach is generally mainstream, coverage is also given to the limitations of standard economic analysis, and this perspective should make the book especially appealing to those students and others who approach economics with some skepticism.

Second, while the book is intended to be accessible to undergraduate students from a variety of backgrounds, coverage of analytically rigorous concepts at the core of environmental and natural resources economics also makes this book appropriate for undergraduate courses serving economics majors. This might especially be the case for economics programs in the liberal arts tradition where students are encouraged to integrate their studies of economics with the other social sciences, natural sciences, and the humanities.

Third, in addition to coverage of the traditional core of the subject, this book also offers coverage of material that is frequently overlooked in other textbooks. For example, chapter 2 focuses on how value systems shape (and are shaped by) economic systems, whereas in other textbooks coverage of values is more commonly limited to explaining utilitarianism as the normative foundation of benefit/cost analysis. Similarly, few books delve into the topic of voluntary overcompliance by firms, an area of growing importance discussed in chapters 7

and 8. Moreover, in addition to the more traditional material in parts I and II of the book, all of part III is addressed to the growing area of sustainability and sustainable development. Special attention is given to sustainability issues at both the international, national, and local community level. Throughout the book, theoretical material is combined with empirical evidence and case studies to facilitate a critical evaluation of the methods of measurement and analysis in economics. A substantial number of citations to scholarly and other relevant materials are offered in each chapter.

This book seeks not only to introduce the standard "core" of environmental and natural resources economics but also to explore some of the fertile areas at the boundary of traditional economics. Rather than building a monument to the glories of economic theory, it is hoped that this book informs readers, fosters critical thinking, and perhaps in a small way contributes to harmonizing economy and environment.

Those of you who browse the World Wide Web are invited to use the Web page that accompanies this book (http://www.humboldt.edu/~envecon). Materials available on the Web page include lecture outlines, diagrams, links to material on environmental and natural resources economics available on the Internet, and interactive simulation learning modules for some of the more analytical material in the book. You will need Excel on your personal computer in order to use the interactive simulation learning modules, but the modules are simple and menu-driven, and so require no extensive knowledge of Excel.

Steve Hackett Arcata, California May 1997

## **Acknowledgments**

This book developed from several courses that I teach at Humboldt State University. I am especially grateful to my students, who have been a source of inspiration, motivation, insight, and encouragement throughout the writing of this book. I would also like to acknowledge the support of my colleagues in the School of Business and Economics. Tom Lyon and Tim Yeager deserve special mention for their encouragement and friendship, and Elinor Ostrom, Jimmy Walker, and Steve Wiggins for their guidance and constructive disputation early in my career. Jeremiah Joyner, Lea Weber, and Lockey White served capably as my student assistants. Finally, I would like to thank Steve Dalphin, executive editor at M.E. Sharpe, as well as an anonymous reviewer, for providing helpful comments on an earlier version of the manuscript.

# **Contents**

Γab	Tables and Figures		
Pre	Preface		
Ack	Acknowledgments		
	Part I. Theory and Fundamentals	1	
1.	Introduction to Environmental		
	and Natural Resources Economics	3	
	Introduction	3	
	Fundamental Concepts	4	
	Some Reasons for Optimism and Some Reasons for Concern	8	
	Reasons for Optimism	8	
	Reasons for Concern	12	
	Overview	13	
	Summary	14	
	Review Questions and Problems	15	
	References and Further Reading	16	
2.	Value Systems and Economic Systems	17	
	Introduction	17	
	Fundamentals of Ethical Systems	18	
	Deontological Ethics	19	
	Teleological Ethics	20	
	A Closer Look at Utilitarianism	21	
	Private Property, Self-Interest, and the Common Good	24	
	Locke and the Liberal Society	24	
	Rousseau and the Civil Society	25	

	On Positive and Normative Economics	27
	Economic Questions That All Societies Must Answer	29
	Summary	29
	Review Questions and Problems	30
	References and Further Reading	30
3.	The Economics of Market Allocation	32
	Introduction	32
	Market Capitalism: Overview and Definition	32
	Overview	32
	Definition	33
	The Efficiency of Competitive Markets	33
	Efficiency	36
	Market Failure	37
	Monopoly, Cartels, and Market Power	37
	Externalities	37
	Collectively Produced and/or Consumed Goods	38
	Imperfect Information	39
	Fairness, Equity, and Distributive Justice	39
	Perspectives on Market Failures and Government	
	Intervention	39
	Summary	40
	Review Questions and Problems	41
	References and Further Reading	41
4.	Externalities: Why Markets Fail to Protect Environmental	
	Quality	42
	Introduction	42
	Externalities	42
	Example 1	42
	Example 2	43
	Definition of Externalities	43
	Property Rights and Externalities	44
	Externalities and Market Failure	46
	Private Costs and the Supply Curve in Competitive Markets	46
	Deriving a Profit-Maximizing Firm's Supply Curve from	
	Its Marginal Cost Curve	48
	Adding Up Individual Firms' Supply Curves to Get	
	the Market Supply Curve	50
	Social Cost	50
	Allowing Firms to Pollute Is Equivalent to a Subsidy on	
	Production	51

	Externalities?	51 51
	Pigouvian Taxes Using Pigouvian Taxes to Internalize Externalities Will Cause	31
	Market Price to Reflect the True Social Costs of Production	52
	Competitive Markets Are Inefficient When There Are	32
	Externalities: The Concept of Deadweight Social Loss	54
	Summary	55
	Review Questions and Problems	56
	References and Further Reading	57
	Appendix: A Calculus-Based Derivation of Supply Curves	58
5.	The Economics of Natural Resource Systems	60
	Introduction and Overview	60
	Allocating Nonrenewable Resources	61
	The Industrial Organization of Energy Delivery in	
	the United States	62
	The Theory of Dynamically Efficient Nonrenewable	
	Resource Pricing	62
	Dynamic Efficiency	. 63
	Allocating Recyclable Resources	66
	Allocating Renewable Resources	68
	Renewable Resources Case Study: Fisheries Economics	69
	Marine Fisheries Management	72
	A Market-Based Approach to Fisheries Management: ITQs	74
	Aquaculture	76
	Allocating Common-Pool Resources	77
	Resources for the Future: Factors Affecting Future	0.0
	Resource Scarcity	82
	Summary  Pavian Overtions and Broklems	85 87
	Review Questions and Problems	87
	References and Further Reading Appendix: The Theory behind the Tragedy of the Commons	89
	Appendix. The Theory benind the Tragedy of the Commons	03
	Part II. Policy	93
	1 art 11. I oney	9.
6.	Pricing the Environment: Measurement and Analysis of	64
	Benefits and Costs	95
	Introduction: Benefit/Cost Analysis	95
	Efficiency	42

Maximizing Net Present Discounted Value (PDV):	
Dynamic Efficiency Revisited	98
An Illustrative Example of Benefit/Cost Analysis	99
The Coase Theorem and the Net Monetary Benefit	
Efficiency Criterion	101
Establishing Property Rights	103
Transactions to Realize Efficiency	103
Limitations of Coasian Contracting: Transaction Costs	
and Free Riding	104
Operationalizing Benefit/Cost Analysis in	
U.S. Environmental Policy	105
Measuring Benefits	106
Overview	106
Measuring the Health and Safety Benefits of Regulation:	
Quantitative Risk Assessment (QRA)	107
Categories of Nonmarketed Environmental Benefits:	
Use, Option, and Existence Values	109
Use Value	109
Option Value	109
Existence and Bequest Value	110
Measuring Nonmarketed Environmental Benefits:	
The Contingent Valuation Method (CVM)	110
Examples of CVM Studies	111
What's Helpful about the CVM?	113
Critique and Defense of the CVM	113
Measuring Nonmarketed Environmental Benefits:	
The Travel Cost Method (TCM)	114
Measuring Nonmarketed Environmental Benefits:	
Hedonic Regression Method (HRM)	116
Measuring Costs	117
Direct Compliance Cost Estimates for the United States	118
Indirect Cost: Adverse Effects of Environmental Regulations	
on Market Structure	119
Summary	121
Review Questions and Problems	123
References and Further Reading	124
The Political Economy of Environmental Regulation and	
Resource Management	126
Introduction: What Is Political Economy?	126
Economic Models of Political Economy and	
the Regulatory Process	127

7.

	The Political Economy of Environmental Regulation	130
	The Political Economy of Local Self-Governance	
	of Common-Pool Resources	132
	The Political Economy of International Environmental Accords:	
	The Case of the Montreal Protocol	135
	Theoretical Foundation	135
	Case Study: The International Political Economy of CFC Control	136
	Summary	140
	Review Questions and Problems	141
	References and Further Reading	142
8.	Motivating Regulatory Compliance:	
	Monitoring, Enforcement, and Sanctions	145
	Introduction	145
	The Economics of Crime	145
	Alternative Ways of Creating Deterrence	149
	Criminal Penalties and Incarceration versus	
	Fines and Monetary Damages	149
	Market-Based Reputational Enforcement	
	and Voluntary Overcompliance	150
	Private Auditing and Other Voluntary Pilot Programs	154
	Incentive Enforcement Systems	155
	EPA Enforcement	156
	EPA Enforcement Trends	157
	Selected EPA and Department of Justice	
	Enforcement Actions	158
	California Enforcement	160
	Compliance	161
	Citizen Suits	161
	Summary	162
	Review Questions and Problems	163
	References and Further Reading	163
9.	Incentive Regulation: Economic Instruments for	
	Environmental Protection and Resource Management	165
	Introduction	165
	Marketable Pollution Allowances	168
	An Illustration of the Cost-Savings Potential from	100
	Marketable Pollution Allowances	169
	Case 1: Traditional Direct Controls and No Marketable	103
	Allowances	169
	Case 2: Fully Marketable Allowances	169
		10)

	Case 3: Limited Allowances Trading	172
	Advantages of Marketable Allowances Systems	174
	Disadvantages of Marketable Allowances Systems	175
	Marketable Pollution Allowances and the Clean Air Act (CAA)	
	Amendments of 1990: The Acid Rain Program	175
	Emissions Trading	178
	Regional Clean Air Incentive Market	179
	Other Experiments with Marketable Pollution Allowances	180
	Environmental Taxes	180
	Examples of Environmental Taxes in the United States	181
	Simulation Research on the Effects of Taxing	
	Carbon Dioxide Emissions	182
	Summary	182
	Review Questions and Problems	184
	References and Further Reading	185
10.	Global Warming: Uncertainty, Irreversibility, and	
	Long-Term Policy Making	186
	Introduction	186
	The Basic Science Linking Greenhouse Gas Emissions	
	to Global Warming	187
	Predictions Regarding Carbon Dioxide Emissions	
	and Global Warming	188
	Predictions Regarding Carbon Dioxide Emissions	188
	Predictions Regarding Global Warming	189
	The Evidence Regarding Global Warming	191
	International Action on Global Warming	193
	The Earth Summit	193
	Policy Studies: The Optimal Control of Greenhouse	
	Gas Emissions	195
	Case Study: Global Warming and China's Economic	
	Development Strategy	199
	Summary	201
	Review Questions and Problems	202
	References and Further Reading	202
	-	
	Part III. Issues in the Economics of the Sustainable Society	205
11	Industrian to the Countries biller Down and	205
11.	Introduction to the Sustainability Perspective Introduction	207
	-	207
	Summary	211

	Review Questions and Problems	212
	References and Further Reading	212
12.	Recognizing Interdependencies and Thinking Long Term	214
	Introduction	214
	Recognizing Interdependencies	214
	The Industrial Revolution and the Agrarian Transition	215
	Income, Poverty, and Economic Growth	216
	Education, Empowerment, and Justice	220
	International Trade	225
	The Argument for International Trade	225
	The Argument against International Trade	226
	Population and Population Growth	230
	Causes and Predicted Implications of Rapid Population Growth	231
	Taxes and Incentives	235
	Thinking Long Term: Discounting and Policy Making	237
	The Effect of Discount Rates on Environmentally Friendly	
	Investments and Sustainability: An Illustrative Example	237
	The Opportunity Cost of Capital and the Social Rate	
	of Time Preference	238
	The Opportunity Cost of Capital	238
	The Social Rate of Time Preference	240
	Are the Discount Rates Associated with Competitive Financial	
	Markets Consistent with Those Required for Sustainability?	242
	Summary	243
	Review Questions and Problems	244
	References and Further Reading	246
12	Sustainable Feenemie Development	249
13.	Sustainable Economic Development Introduction	249
	Conventional Economic Development Strategies	249
	Conventional Economic Development Assistance Programs	250
	Envisioning Sustainable Development: Brundtland Commission	25
	Report and the Earth Summit	254
	Competing Theories of Sustainable Development	255
	Weak-Form Sustainability	255
	Strong-Form Sustainability	256
	Practical Policy Implications	258
	Methods for Measuring Sustainable Development	258
	Indicators of Weak-Form Sustainability	260
	Indicators of Strong-Form Sustainability	262
	Case Studies in Measuring Sustainable Economic Development	263

	Scotland	263
	United States	264
	Sub-Saharan Africa, Latin America, and the Caribbean	265
	Summary	265
	Review Questions and Problems	266
	References and Further Reading	267
14.	Issues in Sustainable Production and Consumption	270
	Introduction	270
	Issues in Sustainable Production and Consumption Technology	272
	Solar Energy	272
	Industrial Ecology	273
	Environmentally Friendly Technologies Ready to Be Deployed	274
	Case Studies in Sustainable Technologies	275
	Low-Emission Vehicles	275
	Solar Cookers	276
	Policies Promoting Sustainable Production and Consumption	277
	Extended Producer Responsibility (EPR)	277
	Ecolabels	278
	Factors Relating to the Success of Ecolabel Programs	278
	Taxes, Subsidies, and Ecological Tax Reform	279
	Case Study: The California Experience in Subsidizing	
	Alternative Energy	279
	Government Research and Development Funding	280
	ISO 14000 International Environmental Certification	280
	Case Study: The Global Race for Environmentally Friendly	
	Technology	281
	Summary	282
	Review Questions and Problems	283
	References and Further Reading	283
15.	Issues in the Economics of Sustainable Local Communities	285
10.	Introduction	285
	Sustainable Local Self-Governance of Localized CPR Systems	285
	Examples of Sustainable Local Communities and the Systems	203
	They Use for Governing CPRs	287
	Törbel, Switzerland	287
	Japanese Village Commons	288
	Spanish Irrigation Commons	288
	Localized Self-Governance of Fisheries	289
	Fodder and Fuelwood Use in Panchavat Community Forests	289
	FOUGER AND FUELWOOD USE IN PANCHAVALL OMMUNITY FORESTS	

Ostrom's Design Principles Associated with Sustainable Local	
Self-Governance of Common-Pool Resources	290
Summary	291
The Economics of Sustainable Community Development	293
Export Base versus Import Substitution	293
The Export-Base Theory of Local Economic Development	293
The Import-Substitution Theory of Local Economic Development	297
Case Studies: Attempts at Moving toward Sustainable Local	
Community Development	298
Willapa Bay	298
Arcata	298
The Cogtong Bay Mangrove Management Project	300
Sustainable Local Economic Development in South Africa	301
Moving toward Sustainable Urban Planning in Curitiba, Brazil	302
Summary	303
Review Questions and Problems	304
References and Further Reading	304
Glossary	307
Index	323
About the Author	329

# **Tables and Figures**

#### **Tables**

3.1	Hypothetical Supply and Demand Schedule Data	34
4.1	Hypothetical Example of the Costs of Producing Cabinets	47
	Example: Profit Maximization Occurs Where Price Equals	
	Marginal Cost	49
4.3	Marginal Private, External, and Social Costs	51
5.1	Change in Catch, Peak Year to 1992	70
5.2	Strategic Form of the Prisoner's Dilemma Game	90
6.1	Hypothetical PDV of Costs and Benefits for Control of	
	Sulfur Dioxide Emissions (in Millions of Dollars)	100
6.2	Pollution-Abatement and -Control Costs in the United States	
	(in Billions of Inflation-Adjusted [1987] Dollars)	119
8.1	Summary of Federal Voluntary Environmental Programs	152
9.1	Summary of Economic Instruments for Environmental Protection	
	and Resource Management	167
9.2	Hypothetical Example of an Industry with Heterogeneous	
	Marginal Abatement Costs	170
9.3	Hypothetical Industrywide Cost of Cutting Emissions by Half	
	Using Traditional Direct-Control Regulation	170
9.4	Hypothetical Industrywide Cost of Cutting Emissions by Half	
	with Fully Marketable Pollution Allowances	171
9.5	Hypothetical Industrywide Cost of Cutting Emissions by Half	
	with Limited Allowances Trading	174
9.6	Simulation Effects of a \$7.50 per Ton Tax on Carbon-Equivalent	
	Emissions for the State of Maryland, 1993	182
12.1	Hypothetical Example: Cost Savings from Home Insulation	238
12.2	Hypothetical Example: Cost Savings from Home Insulation for	
	Different Discount Rates	239

试读结束: 需要全本请在线购买: www.ertongbook\*vii.om