

Contents

	Preface	V
	List of Figures and Tables	XIII
Part I	Introduction	1
Chapter 1	The Problem	3
Chapter 2	Using the Environment – An Allocation Problem	7
	Externalities	7
	Relationship Between the Environment and the Economic System	8
	Material Flows Between the Environment and the Economic System	12
	Competing Uses	13
	Zero Price of Environmental Use	16
	Environmental Effects of Government Decisions	18
	How Much Environmental Quality?	19
	A Taxonomy of the Environmental Problem	19
	Appendix 2A: Input-Output Analysis and the Environment	20
	Appendix 2B: Applied General Equilibrium Models	23
Part II	Static Allocation Aspect	25
Chapter 3	Production Theory and Transformation Space	27
	Production Theory	27
	Variables Affecting the Transformation Space	33
	An Alternative Approach of Production Theory	36
	Appendix 3A: Properties of the Transformation Space	37
	Appendix 3B: Transformation Space with Negative Productivity Effect	41
Chapter 4	Optimal Environmental Use	43
	Criteria for Optimality	43
	Optimization Problem	45
	A Shadow Price for Pollutants	46

	Implications for the Shadow-Price System of the Economy	49
	Optimum and Competitive Equilibrium	50
	Appendix 4 A: Nonlinear Optimization	54
	Appendix 4B: Implications of the Allocation Problem	55
	Appendix 4C: Implications of the Profit Maximum	56
Chapter 5	Environmental Quality as a Public Good	59
	Characteristics of a Public Good	59
	Allocation of Public Goods	62
	Social-Welfare Function	63
	Benefit-Cost Analysis	65
	Costs of Environmental Quality	66
	Evaluation of Environmental Quality	70
	Individual Preferences and the Pareto-Optimal Provision of Environmental Quality	74
	Thesis of Market Failure	77
	Lindahl Solution	77
	Mechanisms of Social Choice	84
	Ethical Aspects of Environmental Evaluation	91
	An Example: Ambient Quality Standards	95
Chapter 6	Property-Rights Approach to the Environmental Problem	97
	Property-Rights Approach	97
	Property Rights and Environmental Allocation	98
	Coase Theorem	99
	Coase Theorem and Transaction Costs	101
	Can Property Rights Be Specified?	102
Part III	Environmental-Policy Instruments	105
Chapter 7	Incidence of an Emission Tax	107
	Standard-Price Approach	107
	Reaction of Producers	109
	Emission Taxes in Monopoly	110
	General Equilibrium Approach	111
	Allocation in a General Equilibrium Model	114
	Pollution Intensities, Factor Intensities, and Allocation Effects	118
	Overshooting of the Emission Tax	120
	Is there a Double Dividend of Emission Taxes?	120
	Instruments in a Second-Best Setting	124
	Appendix 7A: Reaction of the Individual Firm	124
	Appendix 7 B: General Equilibrium Model	124
Chapter 8	Policy Instruments	127
	Transforming Quality Targets into Individual Behavior	127
	The Principal-Agent Problem	128

	Available Policy Instruments	129
	Criteria for Evaluating Instruments	130
	Moral Suasion	131
	Government Financing and Subsidies	132
	Regulatory Approach	132
	Voluntary Agreements	136
	Emission Taxes	136
	Pollution Licenses	140
	The Bubble Concept	145
	Success of Emission Trading	147
	Institutional Arrangements for Cost Sharing	148
	Combining Standards and an Emission Tax	150
	Liability	150
Chapter 9	Policy Instruments and the Casuistics of Pollution	153
	Solid Waste	153
	Optimal Waste Reduction	155
	Establishing Scarcity Prices for Waste with Collection Costs	157
	Waste Management and Spatial Structure	157
	Closed Substance Cycle and Product Responsibility	158
	The German System of Waste Management	158
	Emissions from Mobile Sources	160
	Accidental Emissions	161
	Vintage Damages	161
	Pollutants in Consumption Goods	161
	Pollutants in New Products	162
	Externalities in Land Use	162
Chapter 10	The Political Economy of Environmental Scarcity	163
	The Opportunity Cost Principle	163
	The Polluter-Pays Principle	164
	The Pollutee-Pays Principle	166
	The Precautionary Principle	166
	The Principle of Interdependence	167
	Major Environmental Legislation	168
Part IV	Environmental Allocation in Space	171
Chapter 11	Environmental Endowment, Competitiveness and Trade ...	173
	Environmental Systems in Space	173
	Environmental Endowment	174
	National Environmental Policy and Comparative Advantage	175
	Environmental Policy and Trade Flows	177
	Environmental Policy, Imperfect Competition and Trade	179
	Location Advantage	180

International Specialization and Environmental Quality	180
The Equalization of Prices for Emissions	181
Environmental Policy and Gains from Trade	182
Environmental Pollution: A Race to the Bottom?	183
Empirical Studies of the Impact of Environmental Policy on Trade	184
Trade Policy as a Means for Environmental Protection? ..	185
Environmental Concerns – A Pretext for Protection	187
Environmental Policy and World Trade Order	187
Trade Policy to Solve Transfrontier and Global Pollution Problems?	190
Elements of a Multilateral Environmental Order	192
Environmental Policy in the Single Market	193

Chapter 12 Transfrontier Pollution	195
Transfrontier Diffusion Function Versus International Public Good	195
Distortions from Transfrontier Pollution	196
The Noncooperative Solution to Transfrontier Pollution	196
The Cooperative Solution to Transfrontier Pollution	200
Side Payments	201
The Bargaining Approach to Transfrontier Pollution	203
Policy Instruments for Transfrontier Pollution	204
Positive International Spillovers: The Equatorial Rain Forest	206
Biodiversity	206

Chapter 13 Global Environmental Media	209
Global Warming	209
The Noncooperative Solution to Global Media	210
Side Payments and Global Goods	215
Controlling the Free Rider	216
Sanctions	216
Self-enforcing Contracts	217
Coalitions	217
The Unilateral First Mover	218
Uniform Reduction	219
A Workable System of Transferable Discharge Permits ...	219
Reneging the Contract	220
An International Order for the Global Environment	221
The Kyoto Protocol and Beyond	223
EU Emission Trading	226

Chapter 14 Regional Aspects of Environmental Allocation	229
The Problem	229
Spatial-Allocation Model	232
Regional Implications of a National Environmental Policy	233

	Regional Differentiation of the Emission Tax	233
	Location Advantage	235
	Diagrammatic Explanations	236
	Resource Mobility and Adjustment of Emission Taxes ...	239
	Differences in Environmental Quality	240
	Siting Issues and the National Interest	241
	Regional Versus National Authorities	241
	Some Restraints on Regional Authorities	243
	Regional Autonomy and Environmental Media	244
	Environmental Equity and Specialization of Space	245
	Environmental Policy and Regional Planning	246
	Appendix 14 A: A Regional Allocation Model	247
Part V	Environmental Allocation in Time and Under Uncertainty	249
Chapter 15	Long-Term Aspects of Environmental Quality	251
	The Problem	251
	Dynamic Model	253
	Implications	253
	Three Strategies for Dynamic Environmental Use	255
	Social Discount Rate and Environmental Allocation	259
	Further Determining Factors of the Shadow Price of Emissions	260
	Appendix 15 A: Control Theory	262
	Appendix 15 B: A Dynamic Allocation Model	265
Chapter 16	Economic Growth, Sustainability, and Environmental Quality	267
	Interdependencies Between Environmental Quality, Growth, and Resources	267
	Growth and Environmental Degradation	268
	The Survival Issue	274
	Environmental Quality as a Normative Restriction for Growth	274
	Optimal Growth	276
	Growth with Finite Resources	276
	Weak or Strong Substitutability	277
	Growth with Human Capital	277
	Endogenous Growth	277
	Sustainable Development	278
	Zero Economic Growth	281
	An Optimistic Note: The Environmental Kuznets Curve	283
Chapter 17	Risk and Environmental Allocation	285
	Environmental Risks	285
	Risk and Environmental Quality	287
	A Simple Static Model	289

Risk in an Intertemporal Context	290
Preventive Environmental Policy	292
Irreversibilities and Option Values	293
Allocating Environmental Risks?	294
Risk Reduction	295
Allocating the Costs of Risk Reduction	295
The Response of the Polluter Under Uncertainty	297
About the Author	299
Bibliography	301
Subject Index	329