Contents

Preface Acknowledgements List of Abbreviations		<i>page</i> xv xvii xix
1	Introduction	1
	1.1 Why a Book on Environmental Law and Economics?	1
	1.2 Readership	4
	1.3 Methodology	
	1.4 Synopsis and Structure	5 8
2	Environmental Harm and Efficiency	10
	2.1 Principles of Environmental Law, from an Economic Perspec	ctive 11
	2.2 Pollution as an Externality	13
	2.2.1 External Effects for Firms and States	13
	2.2.2 Internalising the Externality as Goal of Environmental I	5
	2.2.3 EIAs and Internalising Externalities	16
	2.3 The Coase Theorem	18
	2.3.1 Reciprocal Nature of Harm	18
	2.3.2 Example of Conflicting Coasean Property Rights	20
	2.3.3 The Coase Theorem: A Few Constraints	21
	2.3.4 Practical Value of the Coase Theorem	23
	2.3.5 Transboundary Application of the Coase Theorem	24
	2.4 The Need for Legal and Policy Instruments	27
	2.4.1 Determining Optimal Pollution Levels	27
	2.4.2 Rules of Civil Liability	29
	2.4.3 Public Regulation: Command and Control	30
	2.4.4 Market-Based Instruments	31
	2.4.5 Suasive Mechanisms	32

	1
Conte	ents

	2.4.6 Voluntary and Private Mechanisms	32
	2.4.7 Smart Instrument Mixes	33
	2.5 Summary and Conclusion	34
3	Property Rights Approach to Environmental Law	37
	3.1 Importance of Establishing Property Rights	38
	3.1.1 The 'Tragedy of the Commons'	38
	3.1.2 Property Rights as a Remedy	40
	3.2 Examples of Property Rights Approaches to Wildlife	43
	3.2.1 Protection of Elephants	45
	3.2.2 Effectiveness of CITES?	46
	3.2.3 Protecting Rhinoceros via Property Rights	47
	3.2.4 Localised Management	48
	3.2.5 Conditions for Effective Management	51
	3.3 First-Use Doctrine	52
	3.3.1 Economic Principles	52
	3.3.2 Examples	54
	3.3.2.1 US Cases	54
	3.3.2.2 European Examples	56
	3.3.3 Economic Analysis	58
	3.4 Summary and Conclusion	61
4	Environmental Standard Setting	63
	4.1 Legal versus Economic Meaning of Standards	64
	4.2 Types of Environmental Standards	64
	4.2.1 Quality and Target Standards	65
	4.2.2 Emission Standards	66
	4.2.3 Technology or Production Standards	67
	4.2.4 Optimal Standard-Setting and Cost-Benefit Analysis	68
	4.2.5 Optimal Specificity	69
	4.3 Cost-Benefit Analysis and Guidelines of Standard Setting	70
	4.3.1 What Are These Guidelines?	70
	4.3.1.1 BPM in the United Kingdom	71
	4.3.1.2 ALARA in the Netherlands	72
	4.3.1.3 BATNEEC in the IPPC Directive	74
	4.4 Standard-Setting Guidelines and Economic Analysis	74
	4.5 Summary and Conclusion	77
5	Principles of Environmental Law and Environmental Economics	79
	5.1 Introduction	79
	5.2 Sustainable Development	81
	5.2.1 Sources	81

Contents	vii
5.2.2 Legal and Economic Interpretation	82
5.2.3 Valuing Future Generations	83
5.3 Prevention at Source	84
5.3.1 Sources	84
5.3.2 Legal and Economic Interpretation	84
5.4 Proximity Principle	85
5.4.1 Free Trade versus Environmental Protection	86
5.4.2 Exceptions to Article 34: Trade-Restricting Measures	86
5.4.3 Trade of Waste between Efficiency and Ethics	88
5.5 Precautionary Principle	89
5.5.1 Sources and Contents	89
5.5.2 Economic Interpretation	91
5.5.3 The Use of the Precautionary Principle	92
5.6 Polluter Pays Principle	93
5.6.1 Sources	93
5.6.2 Economic Interpretation	94
5.7 Environmental Law and Human Rights	96
5.7.1 Environmental Rights in Constitutions	96
5.7.2 ECHR Case Law	97
5.7.3 Economic Interpretation	98
5.8 Integration	99
5.8.1 Integration of Laws: Codification	99
5.8.2 External Integration	100
5.8.3 IPPC	101
5.8.4 Economic Interpretation	101
5.9 Summary and Conclusion	103
Pricing Environmental Harm	106
6.1 Introduction	106
6.2 Importance of Cost-Benefit Analysis for Environmental	
Policy: General	107
6.2.1 Importance for Environmental Policy	107
6.2.2 Limits of Cost-Benefit Analysis	109
6.3 Cost-Benefit Analysis in Environmental Law and Policy	112
6.3.1 Cost-Benefit Analysis at the European Level	113
6.3.2 Economic Analysis of Soil Clean-Up	114
6.4 Economic Methods to Evaluate Environmental Damage	116
6.5 Summary and Conclusion	117
Market-Based Instruments	119
7.1 Introduction	119
7.2 Role of Environmental Information in the Markets	120

7.3 Regulation by Command and Control	121
7.4 Environmental Permit Trading	124
7.4.1 Basic Principles	124
7.4.2 Design Issues	125
7.4.3 The EU Emissions Trading Scheme	126
7.4.4 Efficacy of Emission Trading Systems	127
7.4.4.1 The 'Living Legend' of the US SO ₂ Trading	/
Programme	127
7.4.4.2 Effectiveness of the EU Emissions Trading Scheme	128
7.5 Payments for Ecosystem Services (PES)	130
7.6 Environmental Taxation	132
7.6.1 Basic Principles and Advantages	132
7.6.2 Critical Issues	133
7.6.3 Some Success Stories	134
7.6.4 The Influence of Private Interest	135
7.7 Elasticities and Distributional Effects on Environmental Welfare	138
7.8 Summary and Conclusion	142
Liability Rules	145
8.1 Economic Principles of Accident Law: Introduction	145
8.1.1 The Goal of Tort Law	145
8.1.2 The Unilateral Case	148
8.1.2.1 Negligence	149
8.1.2.2 Strict Liability	150
8.1.2.3 Differences	150
8.1.3 The Bilateral Case	151
8.1.4 The Activity Level	152
8.2 Negligence versus Strict Liability to Control	
Environmental Harm	154
8.2.1 Economic Criteria	154
8.2.2 A Few Refinements	156
8.2.2.1 Information Differences	156
8.2.2.2 Insolvency: Strict Liability versus Negligence	157
8.2.2.3 Positive Externalities	157
8.2.3 Strict Liability in Environmental Law	158
8.2.3.1 International Level	158
8.2.3.2 Strict Environmental Liability in Statutes	159
8.2.3.3 Strict Environmental Liability in Case Law	161
8.3 Causation	161
8.3.1 Importance of Causation	162
8.3.2 Causal Uncertainty and 'Probability of Causation'	162
8.3.3 Threshold Liability versus Causal Apportionment	163

8.4 Financial Caps	164
8.4.1 Economic Analysis of Caps	165
8.4.1.1 When Costs Are Not Fully Internalised	165
8.4.1.2 A Remedy to Uninsurability?	166
8.4.2 Legal Analysis of Caps	166
8.4.3 Contractual Limitations	167
8.5 Liability Channelling	167
8.5.1 Examples	168
8.5.2 Analysis	169
8.6 Joint and Several Liability	171
8.7 Latency and Retroactive Liability	173
8.7.1 Introduction	173
8.7.2 Statutes of Limitations	173
8.7.3 Examples	174
8.7.4 Time Lapse and Incentives to Prevent Accidents	175
8.8 Empirics	176
8.8.1 Deterrent Effect of CERCLA	176
8.8.2 Strict Liability versus Negligence	178
8.8.3 Increased Liability and Liability Avoidance	178
8.9 Summary and Conclusion	179
Environmental Regulation	182
9.1 Differences between Liability Rules and Regulation	183
9.2 Public Interest Criteria for Regulation	186
9.2.1 Information Asymmetry as a Criterion for Regulatory	
Intervention	186
9.2.2 Insolvency Risk	187
9.2.3 Missing Liability Litigation	188
9.2.4 Administrative Costs	188
9.3 The Need to Regulate Environmental Pollution	189
9.4 Safety Regulation in Practice	190
9.5 Private Interest Theory of Regulation	191
9.5.1 Lobbying for Barriers to Entry or Lenient Standards	191
9.5.2 Influence of Private Interest on Instrument Choice	194
9.5.3 The Choice for the Level of Government	195
9.5.4 Liability Law and Rent Seeking	195
9.5.5 Importance	196
9.6 Self-Regulation, Private Regulation, and Mechanism Design	196
9.7 Combination of Various Instruments	200
9.7.1 Optimality of Diverse Instrumentation	200
9.7.2 Liability and Regulation: Exclusivity?	201
9.7.3 Violation of Regulation and Liability	201

1	1	1	
(JOT	ite	nts

	9.7.4 Compliance with Regulation and Liability	203
	9.7.5 The Search for Smart Mixes of Instruments	206
	9.7.6 Optimal Instrument Mixes in Practice	207
	9.8 Summary and Conclusion	208
10	Environmental Crime	211
	10.1 Introduction	211
	10.2 Why Shift to Public Enforcement?	212
	10.3 Administrative or Criminal Law?	214
	10.4 How to Deter?	216
	10.4.1 Raising Probabilities or Penalties?	216
	10.4.2 Empirics	218
	10.4.3 The Harrington Paradox	220
	10.5 Optimal Sanctions	222
	10.6 Corporate Environmental Crime	225
	10.7 Enforcement Strategies	227
	10.7.1 Deterrence or Cooperation?	227
	10.7.2 Targeting and Risk-Based Enforcement	230
	10.8 Summary and Conclusion	231
11	Insurance for Environmental Damage	233
	11.1 Introduction	233
	11.2 Insurance Theory Applied to Environmental Liability	234
	11.2.1 The Utilitarian Approach	234
	11.2.2 The Transaction Cost Approach	235
	11.2.3 Applied to Environmental Insurance	236
	11.3 Moral Hazard	239
	11.3.1 Definition	239
	11.3.2 Remedies	239
	11.3.2.1 Monitoring	239
	11.3.2.2 Exposing the Insured to Partial Risk	240
	11.3.2.3 Combination	240
	11.3.3 Moral Hazard in Environmental Insurance	241
	11.3.3.1 Monitoring via Policy and Licence	
	Conditions	241
	11.3.3.2 Risk Differentiation	242
	11.3.3.3 The Need for Specialisation	243
	11.4 Adverse Selection	243
	11.4.1 The Problem	243
	11.4.2 The Cure	244

11.5 Capacity	245
11.6 Causal Uncertainty and Joint and Several Liability	247
11.6.1 Joint and Several Liability	2 47
11.6.2 Causal Uncertainty	248
11.7 Compulsory Financial Guarantees	249
11.8 Summary and Conclusion	250
Compensation for Environmental Damage	253
12.1 Introduction	253
12.2 Self-Insurance	254
12.2.1 Theory	254
12.2.2 Evaluation	254
12.3 Risk-Sharing Agreements	255
12.3.1 Theory	255
12.3.2 Case Study: Pools for Vessel-Induced Pollution	
(P&I Clubs)	256
12.3.3 Policy Analysis	257
12.4 Guarantees, Deposits, and Bonds	258
12.4.1 Theory	258
12.4.2 Deposits, Funds, and Bonds as Alternatives	
to Guarantees	259
12.4.3 Evaluation	260
12.5 Compensation Funds	261
12.5.1 Various Types of Funds	261
12.5.1.1 The Rise of Compensation Funds	261
12.5.1.2 Limitation Fund	262
12.5.1.3 Advancement Fund	264
12.5.1.4 Guarantee Fund	264
12.5.1.5 A General Environmental Fund	264
12.5.2 Case Study: The Gulf Coast Claims Facility (GCCF)	265
12.5.2.1 Historical Experience	265
12.5.2.2 Conditions for an Effective Rapid Claims	
Handling Mechanism	267
12.5.3 Funds versus Insurance	269
12.5.3.1 Risk Differentiation	269
12.5.3.2 Costs	2 70
12.5.4 A Compensation Fund for Environmental Damage?	271
12.5.4.1 Guarantee Fund	271
12.5.4.2 Restoration Fund	272
12.6 Summary and Conclusion	273

xi

13	Environmental Federalism	275
	13.1 Introduction	275
	13.2 Starting Points	276
	13.2.1 Tiebout's Model of Federalism	276
	13.2.2 Competing Legal Orders	278
	13.2.3 Bottom-Up Federalism	280
	13.3 Criteria for Centralisation	280
	13.3.1 Transboundary Externalities	280
	13.3.2 Race to the Bottom	282
	13.3.3 Improving Trade	283
	13.3.4 Reduction of Transaction Costs	284
	13.3.5 Providing a Minimum Level of Protection	285
	13.4 Consequences for Environmental Standard Setting	286
	13.4.1 Introduction	286
	13.4.2 Environmental Quality Standards	286
	13.4.3 Emission Limit Values	287
	13.4.4 Policy	288
	13.5 Policy Perspective	288
	13.6 Summary and Conclusion	290
14	The Role of Environmental Law in Developing Countries	292
	14.1 Introduction	292
	14.1 Introduction 14.2 Environmental Kuznets Curve	292 293
	14.2 Environmental Kuznets Curve	293
	14.2 Environmental Kuznets Curve 14.2.1 Concept	293 293
	14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation	293 293 294
	14.2 Environmental Kuznets Curve14.2.1 Concept14.2.2 Explanation14.2.3 Policy Consequences	293 293 294 295
	14.2Environmental Kuznets Curve14.2.1Concept14.2.2Explanation14.2.3Policy Consequences14.2.4Importance	293 293 294 295 297
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 	293 293 294 295 297 297
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 	293 293 294 295 297 297 297
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 	293 293 294 295 297 297 297 298
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 	293 293 294 295 297 297 297 297 298 299
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 	293 293 294 295 297 297 297 297 298 299 301
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 	293 293 294 295 297 297 297 297 298 299 301 302
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 14.4.1 Lacking Administrative Capacity 	293 293 294 295 297 297 297 297 298 299 301 302 303
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 14.4.1 Lacking Administrative Capacity 14.4.2 Corruption 	293 293 294 295 297 297 297 297 298 299 301 302 303 304
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 14.4.1 Lacking Administrative Capacity 14.4.2 Corruption 14.4.3 Environmental Federalism in Developing Countries 	293 293 294 295 297 297 297 297 298 299 301 302 303 304 308
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 14.4.1 Lacking Administrative Capacity 14.4.2 Corruption 14.4.3 Environmental Federalism in Developing Countries 14.4.4 Indicators 	293 293 294 295 297 297 297 298 299 301 302 303 304 308 309
	 14.2 Environmental Kuznets Curve 14.2.1 Concept 14.2.2 Explanation 14.2.3 Policy Consequences 14.2.4 Importance 14.3 Pollution Havens and the Porter Hypothesis 14.3.1 Race to the Bottom or Top? 14.3.2 Porter Hypothesis: Weak and Strong Versions 14.3.3 Empirical Evidence of a Race to the Bottom 14.3.4 Empirical Evidence of Races to the Top 14.4 Optimal Environmental Regulation for Developing Countries 14.4.1 Lacking Administrative Capacity 14.4.2 Corruption 14.4.3 Environmental Federalism in Developing Countries 	293 293 294 295 297 297 297 297 298 299 301 302 303 304 308

15	Epilogue	315
	15.1 Our Motives	315
	15.2 An Effective Methodology for Environmental Law Research	316
	15.3 Legal Models and Policy Verification	317
	15.4 Sustainable Development	317
	15.5 An Evolving Methodology	318
	15.6 An Evolving 'Law of the Environment'	318
	15.7 Evolution in Environmental Policies	319
	15.8 Conclusion	320
Refe	erences	323
Inde	Index	

xiii