SAGE LIBRARY OF ECONOMICS

ECOLOGICAL ECONOMICS

VOLUME 1

The Roots of Ecological Economics

Edited by
Charles Perrings

Los Angeles • London • New Delhi • Singapore • Washington DC

Contents

Appendix of Sources xi
Editor's Introduction: The Economy and its Environment *Charles Perrings* xix

Volume 1: The Roots of Ecological Economics

1 An Inquiry into the Nature and Causes of the Wealth of Nations 1
Adam Smith
2 An Essay on the Principle of Population 11
T. *R. Malthus*
3 Principles of Political Economy with Some of Their Applications to Social Philosophy 16
John Stuart Mill
4 Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life 21
Charles Darwin
5 Resilience and Stability of Ecological Systems 34
C. *S. Holling*
6 Energy and Economic Myths 57
Nicholas Georgescu-Roegen
7 Total Energy Costs in Ecosystems 99
Bruce Hannon
8 The Economics of Exhaustible Resources 119
Harold Hotelling
9 The Economic Theory of a Common-Property Resource: The Fishery 149
H. Scott Gordon
10 The Economics of Overexploitation 170
Colin W. Clark
11 Economic Growth and Quality of the Environment 182
Karl-Goren Mdler
12 Intergenerational Equity and the Investing of Rents from Exhaustible Resources 219
John M. Hartwick
13 On Economics as a Life Science 223
Herman E. Daly
14 The Economics of the Coming Spaceship Earth 236
Kenneth E. Boulding
15 Production, Consumption, and Externalities 246
Robert U. Ayres and Allen V. Kneese
16 The Control of Resources 267
Partha Dasgupta
17 Coevolutionary Development Potential 302
Richard B. Norgaard

Volume 2: Modeling Coupled Ecological-Economic Systems

Editor's Introduction: The Theory of Ecological Economics vii
Charles Perrings

18 Limits to Substitution and Irreversibility in Production and Consumption: A Neoclassical Interpretation of Ecological Economics 1
David I. *Stem*

19 Evolutionary Economics and Environmental Imperatives 28
Robert Ayres

20 Empirical Cyclic Stabilization of an Oyster Reef Ecosystem 47
Bruce Hannon

21 Analysis: A Metapopulation Model with Private Property and a Common Pool 61
Gardner Brown and Jonathan Roughgarden

22 Diversity, Productivity and Temporal Stability in the Economies of Humans and Nature 71
David Tilman, Stephen Polasky and Clarence Lehman

23 Necessary and Sufficient Conditions for the Equivalence of Economic and Ecological Criteria in Range Management 94
Amitrajeet A. Batabyal

24 Economic Land Use, Ecosystem Services and Microfounded Species Dynamics 108
Thomas Eichner and Riidiger Pethig

25 Protecting an Endangered Species While Harvesting Its Prey in a General Equilibrium Ecosystem Model 128
David Finnoff and John Tschirhart

26 Managing Ecologically Interdependent Species 156
Erwin H. *Bulte and Richard Damania*

27 Optimal Ecosystem Management When Species Compete for Limiting Resources 170
William Brock and Anastasios Xepapadeas

28 Optimal Spatial Management of Renewable Resources: Matching Policy Scope to Ecosystem Scale 203
James N. Sanchirico and James E. Wilen

29 Uncertainty and Sustainability in the Management of Rangelands 229
Martin E Quaas, Stefan Baumgartner, Christian Becker, Karin Frank and Birgit Midler

30 Conservation in the Optimal Use of Rangelands 261
Charles Peirings and Brian Walker

31 On Trade, Land-Use, and Biodiversity 274
Stephen Polasky, Christopher Costello and Carol McAusland

32 Management of Eutrophication for Lakes Subject to Potentially Irreversible Change 290
S. R. Carpenter, D. Ludwig and W. A. Brock

33 The Economics of Shallow Lakes 327
Karl-Goran Ma'ler, Anastasios Xepapadeas and Aart De Zeeuw

34 Integrated Ecological Economic Modeling of the Patuxent River Watershed, Maryland 348
Robert Costanza, Alexey Voinov, Roeloj Boumans, Thomas Maxwell, Ferdinando Villa, Lisa Wainger and Helena Voinov
35 Human—Ecosystem Interactions: A Dynamic Integrated Model 394
Bobbi Low, Robert Costanza, Elinor Ostrom, James Wilson *and Carl P. Simon*

Volume 3: Ecosystem Services

Editor's Introduction: Ecosystem Services and Ecological Economics vii
Charles Perrings

36 Estimating the Demand for Environmental Services 1
Karl-Goren Mdler
37 Valuing Nature: Lessons Learned and Future Research Directions 27
R. *Kerry Turner, Jouni Paavola, Philip Cooper, Stephen Farber, Valmajessamy and Stavros Georgiou*
38 The Value of Nature and the Nature of Value 49
Gretchen C. Daily, Tore Soderqvist, Sara Aniyar, Kenneth Arrow, Partha Dasgupta, Paul R. Ehriich, Carl Folke, AnnMari Jansson, Bengt-Owe Jansson, Nils Kautsky, Simon Levin, Jane Lubchenco, Karl-Goran Mdler, David Simpson, David Starrett, David Tilman and Brian Walker
39 On the Scarcity Value of Ecosystem Services 55
Amitrajeet A. Batabyal, James R. Kahn, and Robert V. O'Neill
40 Valuing Biodiversity from an Economic Perspective: A Unified Economic, Ecological, and Genetic Approach 75
William A. Brock and Anastasios Xepapadeas
41 Valuing Ecosystem Services as Productive Inputs 100
Edward B. Barbier
42 Deriving Values for the Ecological Support Function of Wildlife: An Indirect Valuation Approach 150
Bryon P. Allen and John B. Loomis
43 Transferring Environmental Value Estimates: Issues and Alternatives 162
Cltve L. *Spash and Arild Vatn*
44 Valuation of Ecosystem Goods and Services Part 1: An Integrated Dynamic Approach 182
Ralph *Winkler*
45 Valuation of Ecosystem Goods and Services Part 2: Implications of Unpredictable Novel Change 204
Ralph Winkler
46 Mapping Ecosystem Services: Practical Challenges and Opportunities in Linking GIS and Value Transfer 227
Austin Troy and Matthew A. Wilson

47 Local Identification and Valuation of Ecosystem Goods and Services from Opuntia Scrublands of Ayacucho, Peru 253
Luis *C. Rodriguez, Unai Pascual and Hermann M. Niemeyer*
48 Genuine Savings Rates in Developing Countries 274
Kirk Hamilton and Michael Clemens
49 Wealth, Natural Capital, and Sustainable Development: Contrasting Examples from Botswana and Namibia 297
Glenn-Marie Lange
50 Net National Product, Wealth, and Social Weil-Being 320
Partha Dasgupta and Karl-Goran Mdler

Volume 4: Sustainability

Editor's Introduction: Sustainability Science and Ecological Economics vii
Charles Perrings

51 World Commission on Environment and Development: Towards Sustainable Development 1
World Commission Report
52 Are We Consuming Too Much? 18
Kenneth Arrow, Partha Dasgupta, Lawrence Goulder, Gretchen Daily, Paul Ehriich, Geoffrey Heal, Simon Levin, *Karl-Goran Mdler, Stephen Schneider, David Starrett and Brian Walker*
53 Sustainability Science 43
Robert W Kates, William C. Clark, *Robert CorellJ. Michael Hall, Carlo C.Jaeger, Ian Lowe, James J. McCarthy, Hans Joachim Schellnhuber, Bert Bolin, Nancy M. Dickson,* Syfvie *Faucheux, Gilberto C. Gallopin, Arnulf Grilbler, Brian Huntley, Jill Jdger, Narpat S.Jodha, Roger E. Kasperson, Akin Mabogunje, Pamela Matson, Harold Mooney, Berrien Moore 111, Timothy O'Riordan and Uno Svedin*
54 Economic Growth, Carrying Capacity, and the Environment 48
Kenneth Arrow, Bert Bolin, Robert Costanza, Partha Dasgupta, Carl Folke, C. S. Holling, Bengt-Owe Jansson, Simon Levin, Karl-Goran Mdler, Charles Perrings and David Pimentel
55 The Rise and Fall of the Environmental Kuznets Curve 53
David 1. Stern
56 Economic Pathways to Ecological Sustainability 81
Partha Dasgupta, Simon Levin and Jane Lubchenco
57 Operationalizing Sustainable Development: Dynamic Ecological Economic Models 94
Jeroen C.J.M. *van den Bergh and Peter Nijkamp*
58 Sustainable Development in a Post-Brundtland World 113
Chris Sneddon, Richard B. Howarth and Richard B. Norgaard
59 Towards an Operational Sustainability Criterion 134
Richard B. *Howarth*

60 Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation? 147
Kenneth J. Arrow, Maureen L. Cropper, George C. Eads, Robert W. Hahn, Lester B. Lave, Roger G. Noll, Paul R. Portney, Milton Russell, Richard Schmalensee, V. Kerry Smith and Robert N. Stavins

61 Toward an Experimental Foundation for Benefit-Cost Analysis 152
John M. Gowdy

62 Sustainability Policy and Environmental Policy 164
John C. V. Pezzey

63 Natural Resource Rents, Economic Dynamics and Structural Change: A Capital Theoretic Approach 182
Malte Faber *and John* L.R. *Proops*

64 Towards an Ecological Economics of Sustainability 206
Mick Common and Charles Perrings

65 Evolutionary Policies for Sustainable Development: Adaptive Flexibility and Risk Minimising 230
Christian Rammel andjeroen C.J.M. van den Bergh

66 From Metaphor to Measurement: Resilience of What to What? 249
Steve Carpenter, Brian Walker, J. Marty Anderies and Nick Abel

67 Social-Ecological Resilience to Coastal Disasters 275
W Neil *Adger, Terry P. Hughes, Carl Folke, Stephen R. Carpenter and Johan Rockstro'm*

68 The Genuine Savings Criterion and the Value of Population 284
Kenneth J. Arrow, Partha Dasgupta and Karl-Goran Mdler

69 Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations 293
Carl Folke, Steve Carpenter, Thomas Elmqvist, Lance Gunderson, C.S. Holling, Brian Walker, Jan Bengtsson, Fikret Bakes, Johan Colding, Kjell Danell, Malin Falkenmark, Line Gordon, Roger Kasperson, Nils Kautsky, Ann Kinzig, Simon Levin, Karl-Goran Mdler, Fredrik Moberg, Leif Ohlsson, Per Olsson, Elinor Ostrom, Walter Reid, Johan Rockstrom, Hubert Savenije and Uno Svedin