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Jon M. Conrad

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Resource Economics, Second Edition

Resource Economics is a text for students with a background in calculus and intermediate microeconomics and a familiarity with the spreadsheet program Excel. The book covers basic concepts (Chapter 1); shows how to set up spreadsheets to solve simple dynamic allocation problems (Chapter 2); and presents economic models for fisheries, forestry, nonrenewable resources, and stock pollutants (Chapters 3–6). Chapter 7 examines the maximin utility criterion when the utility of a generation depends on consumption of a manufactured good, harvest from a renewable resource, or extraction from a nonrenewable resource. Within the text, numerical examples are posed and solved using Excel's Solver. Exercises are included at the end of each chapter. These problems help to make concepts operational, develop economic intuition, and serve as a bridge to the study of real-world problems in resource management.

Jon M. Conrad is Professor of Resource Economics in the Department of Applied Economics and Management at Cornell University. He taught at the University of Massachusetts, Amherst, from 1973 to 1977, joining the Cornell faculty in 1978. His research interests focus on the use of dynamic optimization techniques to manage natural resources and environmental quality. He has published articles in the *Journal of Political Economy*, the *Quarterly Journal of Economics*, the *American Journal of Agricultural Economics*, the *Canadian Journal of Economics*, *Land Economics*, *Marine Resource Economics*, *Biomathematics*, *Ecological Economics*, *Natural Resource Modeling*, and the *Journal of Environmental Economics and Management*, where he served as an Associate Editor. He is coauthor, with Colin Clark, of the text *Natural Resource Economics: Notes and Problems* (Cambridge University Press, 1987) and is past President of the Resource Modeling Association. Cambridge published the first edition of *Resource Economics* in 1999.

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The first edition of this text was dedicated to my wife, Janice, and our sons, Andrew and Benjamin (a.k.a. Benj). This second edition is dedicated to our grandchildren, Grady and McKenna.

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Preface to the Second Edition: What Stayed, What Went, What's New?

The second edition of *Resource Economics* has expanded the first six chapters of the first edition, added an entirely new Chapter 7 (“Maximin Utility with Renewable and Nonrenewable Resources”), and deleted Chapter 7 (“Option Value and Risky Development”) and Chapter 8 (“Sustainable Development”) from the first edition. Most of the exercises at the end of each chapter are new. In Chapter 1, “Basic Concepts,” separate sections have been added on simulation, steady state, and local stability (1.1); extraction of a nonrenewable resource (1.2); asymptotic depletion of a nonrenewable resource (1.5); the maximum principle and dynamic programming in discrete time (1.6); dynamic programming in a two-period, two-state model (1.7); and the Markov decision model and stochastic dynamic programming (1.8). The last three sections in Chapter 1 were designed to introduce students to more advanced methods of dynamic optimization that would be encountered in a graduate program.

Chapter 2, “Solving Numerical Allocation Problems Using Excel’s Solver,” has been significantly expanded and now presents 11 problems to show how Excel’s Solver can be used to find the optimal rotation for an even-aged stand of trees (2.1); the steady-state optimal fish stock (2.2); the optimal date of exhaustion for a nonrenewable resource (2.3); the optimal first-period harvest in a two-period, two-state fishery (2.4); the optimal linear harvest policy in a finite-horizon fishery (2.5); the optimal escapement in a finite-horizon fishery (2.6); the optimal escapement for one “realization” in a stochastic fishery (2.7); the mine-manager’s problem (2.8); approximating the asymptotic approach to

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a steady-state optimum (2.9); the most rapid approach to an optimal pollution stock (2.10); and optimal escapement with stochastic growth (2.11).

Chapter 3, “The Economics of Fisheries,” now has a section on regulated open access (3.6) and an expanded discussion of bioeconomic-based policies, including the first of two articles by John Tierney, “A Tale of Two Fisheries” (3.10). Section 3.11 discusses marine reserves and rotational management in a fishery with an application to the Atlantic sea scallops (and culinary advice from the Sea Grant Program at the University of Delaware).

Chapter 4, “The Economics of Forestry,” is essentially unchanged from the first edition, although some pesky typos have been corrected. (Hopefully no new ones have been introduced!)

Chapter 5, “The Economics of Nonrenewable Resources,” has had improvements in exposition and includes the second of John Tierney’s articles, a classic entitled “Betting the Planet.” There is also a postscript to “Betting the Planet” (5.9).

Chapter 6, “Stock Pollutants,” swaps out Section 6.6 from the first edition, which dealt with recycling and now presents a two-period, two-state model of climate change. Other than that switch, things are much the same.

The new Chapter 7, “Maximin Utility with Renewable and Nonrenewable Resources,” introduces the maximin criterion to a macroeconomic growth model with both renewable and nonrenewable resources. The maximin criterion is applied in models with nonoverlapping and overlapping generations.

One thing hasn’t changed, and that’s the underlying philosophy of the text: *Simple numerical problems make theoretical concepts operational and provide a bridge to serious empirical research.* Have fun!

Jon M. Conrad
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Acknowledgments

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