

Department of Agricultural and Resource Economics  
University of Maryland  
Fall 2008

## **AREC 453: Natural Resources and Public Policy**

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Prerequisites: Intermediate microeconomics (ECON 306 or equivalent)  
Calculus (MATH 220 or equivalent)

### **Course Description**

This is an advanced course covering the ways in which economics is used to analyze natural resource policy issues. We will cover the basic principles and methods economists have developed to characterize the efficient use of natural resources ranging from minerals and energy to fisheries and other wildlife, forestry, and water. We will study the kinds of problems commonly encountered in our actual uses of natural resources and their root causes in the ways that markets function. We will use our understanding of those root causes to see what kinds of policies ought, in principle, to remedy those problems. And we will look at ways of determining how well different kinds of policies work in actual practice using the tools of quantitative economic analysis.

### **Reference Material**

There is no required textbook. The required reading consists of my lecture notes, supplemented by readings on specific topics from various periodicals. Students should be prepared to discuss the lecture notes and assigned reading every class period. Both my lecture notes and the required readings will be posted electronically on ELMS in advance of each lecture. The course outline below contains a preliminary list of these other required readings. I may find other readings while I'm preparing each topic, so you can expect the reading assignments to change from this list. You should check ELMS several times a week for updates. Updated reading assignments and the associated articles will be posted electronically on ELMS.

Several blogs have interesting material on natural resource economics, including topics that will be covered in this course. I strongly recommend checking out Environmental Economics at <http://www.env-econ.net/> on a regular basis. Econbrowser at <http://www.econbrowser.com/> is mainly concerned with macroeconomics and trade but also has coverage of energy issues that is well worth reading. We will use current

material from these and other blogs from time to time. If you encounter something you find interesting on one of these blogs, feel free to bring it up for discussion at the beginning of class.

## Course Requirements

There will be ten quizzes, a midterm, and a final exam. The final grade will be weighted as follows:

Class participation	10%
Quizzes	25%
Midterm exam	30%
Final exam	35%

***Class participation.*** You will be asked to prepare material for class discussion several times during the semester. The material you prepare and your participation in these discussions will be counted in the final course grade. I encourage comments and questions on the assigned material and issues related to it in general; all of your comments and questions will also be counted toward the participation component of the final course grade.

***Quizzes.*** There will be 10 short quizzes, administered online in ELMS. They will be open book, open note, multiple choice. The questions will cover class notes, supplemental readings, and economic analysis of natural resource policy issues using graphical and/or numerical models like those covered in class. Quizzes will be made available Thursday evenings and must be completed by 8 am Tuesday morning. You will be able to review your answers once they've been submitted but you will not be allowed to change them.

***Midterm exam.*** There will be one midterm exam in October. The exam will last 75 minutes and will cover the material discussed up until that date. The date of the exam will be posted on ELMS as soon as it is determined.

***Final Exam.*** The final exam will be given Tuesday, December 16, at 8 am. It will last 2 hours and will cover all of the material in the course. Those who score a B or higher on the midterm and all of the quizzes prior to the midterm may choose to do a project instead of taking the final exam. Details of the project assignment are given below.

I expect every student in this course to conform to the University's Code of Academic Integrity, available on the Web at <http://www.shc.umd.edu/code.html>.

Finally, if you'd like to know more about me, you can get information on my background and work at [http://www.arec.umd.edu/People/Faculty/Lichtenberg\\_Erik/index.cfm](http://www.arec.umd.edu/People/Faculty/Lichtenberg_Erik/index.cfm), which also contains a link to my personal web page.

## Project

Those who score a B or higher on the midterm and all of the quizzes prior to the midterm may choose to do a project instead of taking the final exam. The project will involve conducting an economic analysis of a natural resource policy issue. I will provide a list of possible topics but will consider proposals of other topics of special interest to you. Your topic is subject to my approval and will be discussed in special office hours to be scheduled later. Papers written on topics I consider inappropriate will receive a grade of zero, so be sure to get my approval for your topic.

The goal of this project is to conduct an evidence-based assessment of a specific policy proposal so you will need to choose a topic for which you can acquire quantitative evidence. The project will need to include:

- An identification of the market failure(s)/source(s) of economic inefficiency underlying the problem.
- A quantitative analysis of the magnitude(s) of the market failure(s) involved.
- Specifics about the mechanisms through which the policies being proposed to make improvements will remedy the market failure(s) involved.
- Specifics about the magnitude of the policies being proposed, e.g., how large remedial taxes, quotas or other limits on the activity causing the problem, etc., should be.
- Potential obstacles to implementation or limitations of your proposed policies.

**First draft.** A file containing the first draft should be uploaded to ELMS by midnight Tuesday, December 2. Late assignments will be penalized by 5% for each day late, beginning at the stroke of midnight. The draft counts for 15% of your final grade, as much as the final version, so I expect it to be nearly complete. You should be able to find material for this analysis in journal articles, books, and technical reports (much of which is available online). You will need to use (and cite) at least three different references. You will need to include citations for all the facts used in your study as well as opinions or conclusions you got from any source other than your own reasoning. Direct quotes from any source must be placed in quotation marks, with the source cited. Citations should include the name(s) of the author(s) and date of publication and should be placed in the text in parentheses. The draft must include a complete reference list.

Both the first and final drafts of the paper should be at least 5 and no more than 10 pages typed, double-spaced, and in 12 point font; graphs, tables, and the list of references cited do not count toward the page limit.

**Final draft.** A file containing the final draft must be uploaded to ELMS by midnight the day of the final exam (December 16). Late assignments will be penalized by 5% for each day late, beginning at the stroke of midnight. I expect the final draft to be noticeably

improved from the first draft, regardless of how good the first draft was. I also expect it to contain revisions made in response to my comments on your first draft. Revising written work in response to comments received is standard in any job involving writing (reports, memos, journalism, etc.) so one goal of this exercise is to give you practice doing so. I will grade the final draft accordingly: The draft itself will be worth 15% of the final grade and the extent to which you have incorporated my comments on the first draft will be worth the remaining 5% of your final grade.

**Feel free to consult me for help at any point in working on this project.**

## Course Outline and Preliminary Reading List

### Part I: Methods of Analysis

#### A. Overview of Natural Resources in the Economy

#### B. Markets, Efficiency, and Market Failures (Public Goods, Externalities, Open Access)

Lawrence H. Goulder and Ian W.H. Parry, "Instrument Choice in Environmental Policy", Review of Environmental Economics and Policy 2(2008), 152-174.

Jack L. Knetsch, "Environmental Policy Implications of Disparities between Willingness to Pay and Compensation Demanded Measures of Values", Journal of Environmental Economics and Management 18(1990), 227-237.

#### C. Time and Discounting

Kenneth J. Arrow, "Discounting, Morality, and Gaming", in Paul R. Portney and John P. Weyant (ed.), Discounting and Intergenerational Equity, Resources for the Future, Washington, 1999.

Martin L. Weitzman, "Just Keep Discounting, But ...", in Paul R. Portney and John P. Weyant (ed.), Discounting and Intergenerational Equity, Resources for the Future, Washington, 1999.

#### D. Analysis of Discrete Investments: Energy Conservation

Joseph Eto, Suzie Kito, Leslie Shown, and Richard Sonneblick, "Where Did the Money Go? The Cost and Performance of the Largest Commercial Sector DSM Programs", The Energy Journal 21(2000), 23-49.

Lorna Greening, David L. Greene, and Carmen Difiglio, "Energy Efficiency and Consumption—the Rebound Effect—A Survey", Energy Policy 28(2000), 389-401.

#### E. General Theory of Resource Management over Time

### Part II: Exhaustible Resources: Minerals and Energy

#### A. Economics of Mineral Extraction

#### B. Current Trends in Oil and Gasoline Markets

- James D. Hamilton, "Understanding Crude Oil Prices", Department of Economics, University of California San Diego, June 4, 2008.
- John Cook, "Next Stop for Oil Prices: \$100 or \$150?", Energy Information Agency Petroleum Division, Department of Energy, Washington, DC June 11, 2008.
- Energy Information Agency, "Short Term Energy Outlook", Department of Energy, Washington, DC, August 12, 2008.
- Energy Information Administration, "This Week in Petroleum", US Department of Energy, Washington, DC.
- Energy Information Administration, Annual Energy Outlook 2008, US Department of Energy, Washington, DC, May 2007.
- OPEC, "World Oil Outlook 2008", Vienna, Austria 2008.

#### C. Transportation Policy: Increasing Domestic Production, Biofuels, and More

- Energy Information Administration, "Impacts of Increased Access to Oil and Natural Gas Resources in the Lower 48 Federal Outer Continental Shelf", US Department of Energy, Washington, DC, 2007.
- Energy Information Administration, "Impacts of Crude Oil Production in the Arctic National Wildlife Refuge", US Department of Energy, Washington, DC, May 2008.
- Ian W.H. Parry, Margaret Walls, and Winston Harrington, "Automobile Externalities and Policies", Journal of Economic Literature 45(2007), 373-399.
- Mark Delucchi, "Do Motor Vehicle Users in the US Pay Their Way?", Transportation Research Part A 41(2007), 982-1003.
- Alexander E. Farrell et al. "Ethanol Can Contribute to Energy and Environmental Goals", Science 311(2006), 506-508 plus erratum and supplemental material.
- Jason Hill, Erik Nelson, David Tilman, Stephen Polasky, and Douglas Tiffany, "Environmental, Economic, and Energetic Costs and Benefits of Biodiesel and Ethanol Biofuels", Proceedings of the National Academy of Sciences 103(2006), 11206-11210.
- Charlotte Schubert, "Can Biofuels Finally Take Center Stage?", Nature Biotechnology 24(2006), 777-784.
- Stefan Tangerman, "What's Causing Global Food Price Inflation?", Vox EU, 22 July 2008.
- Paul C. Westcott, "Ethanol Expansion in the United States: How will the Agricultural Sector Adjust?", FDS-07D-01, Economic Research Service, US Department of Agriculture, Washington, DC, May 2007.

### Part III: Fisheries—Property Rights Failures and Their Remedies

#### A. Fisheries in Trouble: Overview

Ray Hilborn et al., “State of the World’s Fisheries”, Annual Review of the Environment and Resources 28(2003), 359-399.

#### B. Fishery Dynamics and Equilibrium under Open Access

J.R. Beddington, D.J. Agnew, and C.W. Clark, “Supporting Online Material: Current Problems in the Management of Marine Fisheries”, Science 316(2007), 1713-1716.

#### C. Fishery Policy in the US and Beyond

J.R. Beddington, D.J. Agnew, and C.W. Clark, “Current Problems in the Management of Marine Fisheries”, Science 316(2007), 1713-1716.

Ray Hilborn, J.M. (Lobo) Oresanz, and Ana M. Parma, “Institutions, Incentives, and the Future of Fisheries”, Philosophical Transactions of the Royal Society B 360(2005), 47-57.

Richard A. Wallace and Kristen M. Fletcher, “Understanding Fisheries Management, Second Edition”, Publication 00-0005 of the Mississippi-Alabama Sea Grant Consortium.

Felicia C. Coleman, William F. Figuera, Jeffrey S. Ueland, and Larry B. Crowder, “The Impact of United States Recreational Fisheries on Marine Fish Populations” Scienceexpress, 26 August 2004.

### PART IV: Forestry

#### A. Economically Efficient Forest Management

Montgomery, C.A. and D.M. Adams, “Optimal Timber Management Policies”, in D. Bromley (ed.), Handbook of Environmental Economics. Oxford: Blackwell, 1995, 379-404.

Jeffrey R. Vincent and Clark S. Binkley, “Efficient Multiple-Use Forestry May Require Land-use Specialization”, Land Economics 69(1993), 370-376.

#### B. Forest Fires

Michael P. Dombeck, Jack E. Williams, and Christopher A. Wood, “Wildfire Policy and Public Lands: Integrating Scientific Understanding with Social Concerns across Landscapes”, Conservation Biology 18(2004), 883-889.

Marvin Dodge, “Forest Fuel Accumulation—A Growing Problem”, Science 177(1972), 139-142.

- Robert L. Beschta et al., "Postfire Mangement on Forested Public Lands of the Western United States", Conservation Biology 18(2004), 957-967.
- Office of the Inspector General, USDA, "Audit Report: Forest Service Large Fire Suppression Costs", Report No 08601-44-SF, November 2006.
- Jack D. Cohen, "Reducing the Wildland Fire Threat to Homes: Where and How Much?", USDA Forest Service General Technical Report PSW-GTR-173, 1999.
- David Calkin et al., "Comparing Resource Values at Risk from Wildfires with Forest Service Fire Suppression Expenditures: Examples from the 2003 Western Montana Wildfire Season", Research Note RMRS-RN-24WWW, Rocky Mountain Research Station, Forest Service, US Department of Agriculture, February 2005.

#### C. Deforestation and Conservation in the Tropics

- FAO, "State of the World's Forests", Rome, 2005, chapter 1.
- FAO, "Global Forest Resource Assessment", Rome, 2005, chapter 2.
- R. David Simpson, "Biodiversity Prospecting: Shopping the Wilds Is Not the Key to Conservation", Resources 126(Winter 1997), 12-15.
- Christopher Costello and Michael Ward, "Search, Bioprospecting, and Biodiversity Conservation", Journal of Environmental Economics and Management 52(2006), 615-626.
- Anthony Artuso, "Bioprospecting, Benefit Sharing, and Biotechnological Capacity Building", World Development 30(2002), 1355-1368.
- Rex Dalton, "Bioprospects Less Than Golden", Nature 429(2004), 598-600.
- Robin Naidoo and Wiktor L. Adamowicz, "Economic Benefits of Biodiversity Exceed Costs of Conservation at an African Rainforest Preserve", Proceedings of the National Academy of Sciences 102(2005), 16712-16716.
- George Wittemyer et al., "Accelerated Human Population Growth at Protected Area Edges", Science 321(2008), 123-126.

#### D. Community Based Forest Management

- Bruce Campbell et al., "Challenges to Proponents of Common Property Resource Systems: Despairing Voices from Social Forests of Zimbabwe", World Development 29(2001), 589-600.
- Christopher B. Barrett, Katrina Brandon, Clark Gibson, and Heidi Gjertsen, "Conserving Tropical Biodiversity amid Weak Institutions", BioScience 51(2001), 497-502.
- Agnes Kiss, "Is Community-Based Ecotourism a Good Use of Biodiversity Conservation Funds?", Trends in Ecology and Evolution 19(2004), 232-237.

## PART V. Water—Scarcity and Institutions

### A. Overview

- Mark W. Rosegrant, Ximing Cai, and Sarah A. Cline, “World Water Outlook to 2025: Averting an Impending Crisis”, International Food Policy Research Institute, Washington, DC, September 2002.
- Charles J. Vörösmarty, Pamela Green, Joseph Salisbury, and Richard B. Lammers, “Global Water Resources: Vulnerability from Climate Change and Population Growth”, Science 289(2000), 284-288.

### B. Urban Water Pricing, Water Conservation, and Urban Growth in the US and Canada

- High Sibly, “Efficient Urban Water Pricing”, Australian Economic Review 39(2006), 227-237.
- Sheila M. Olmstead and Robert N. Stavins, “Comparing Price and Non-Price Approaches to Urban Water Conservation”, Working Paper 14147, National Bureau of Economic Research, Cambridge, MA, June 2008.
- Steven Renzetti, “Municipal Water Supply and Sewage Treatment: Costs, Prices, and Distortions”, Canadian Journal of Economics 32(1999), 688-704.

### C. Irrigation Water Pricing in the Western US

- Donald J. Pisani, “Federal Reclamation and the American West in the Twentieth Century”, Agricultural History 77(2003), 391-419.
- Paul N. Wilson, “Economic Discovery in Federally Supported Irrigation Districts: A Tribute to William E. Martin and Friends”, Journal of Agricultural and Resource Economics 22: 61-77, 1997.
- David Zilberman, Neal MacDougall, and Farhad Shah, “Changes in Water Allocation Mechanisms for California Agriculture”, Contemporary Policy Issues 12: 122-133, 1994.
- Marca Weinberg, “Assessing a Policy Grab Bag: Federal Water Policy Reform”, American Journal of Agricultural Economics 84(2002), 541-556.

### D. Water Markets in the Western US

- Jack Hirshleifer and J. W. Milliman, “Urban Water Supply: A Second Look”, American Economic Review Papers and Proceedings 57(1967), 169-178.
- Howard Chong and David Sunding, “Water Markets and Trading”, Annual Review of Environment and Resources 31(2006), 239-264.

Jedidiah Brewer, Robert Glennon, Alan Ker, and Gary Libecap, "Water Markets in the West: Prices, Trading and Contractual Forms", Economic Inquiry 46(2006), 91-112.

Richard Howitt and Kristiana Hansen, "The Evolving Western Water Markets", Choices 20(2005), 59-63.

Janis Carey, David L. Sunding, and David Zilberman, "Transaction Costs and Trading Behavior in an Immature Water Market", Environment and Development Economics 7(2002), 733-750.