Economics 352 Noelwah R. Netusil
Fall 2016 Vollum 227, ext. 7306
Syllabus e-mail: netusil@reed.edu

Natural Resource Economics

Course Objective: This course presents an economic analysis of renewable and nonrenewable natural resources. Concepts include static and dynamic efficiency, equity, property rights, discounting, market failure, non-market valuation, and sustainability. The course will cover current and proposed policies for resource management such as transferable quotas, taxes, subsidies, regulations, and public versus private ownership. Prerequisites include Economics 201 and calculus.

Office Hours: Office hours will be held in Vollum 227 on Mondays and Wednesdays from 3:00-4:00pm and Thursdays from 4:00-5:00 pm. Students who are unable to come during these times are encouraged to make an appointment.

Text and Required Readings: The text for this course is *The Economics of Natural Resource Use* (2nd edition) by John M. Hartwick and Nancy D. Olewiler. In addition to the text, students are responsible for the required readings on the attached list and for additional readings that will occasionally be announced in class. Students are expected to contribute to class discussions by finding examples of current natural resource issues in the business, financial, and general press and posting readings on the course Moodle site.

Evaluation: Evaluation will be based on a midterm examination, a comprehensive final examination, participation in a group project, three homework assignments and class participation. Weights for calculating the final grade are posted on Moodle.

Collaboration: All submitted work is expected to reflect your work on the assignment. You are encouraged to work with classmates, tutors, and the instructor on problem sets. However, when you write the assignment, it must be your work and should be written in words that reflect your understanding of the course material. The Honor Principle and the ethics of proper academic conduct must guide your conduct in this class in all respects. The following section from the Reed College Guidebook summarizes my expectations:

> *Reed College is a community of scholars. The fundamental ethical principle governing scholarship is that one should never claim or represent as one's own work that which is not one's own. The principle of proper academic conduct requires that all work submitted for academic purposes--including, but not limited to examinations, laboratory reports, essays, term papers, homework exercises, translations, and creative work--be the work of the person who submits it, and that, in the case of work based upon experiment and observation, the experimental results and observations be reported faithfully. The principle thus requires that no one claim authorship to the work of another and that no one falsify or misrepresent empirical data. This principle should be clear to every*

scholar, although determining its application in particular circumstances will require careful thought and guidance.[1]

Citations: Citations should be used when appropriate and should follow the guidelines in the Economic Department Citation Guide, which is available on the class Moodle site.

Materials on Reserve: The following texts are on 2-hour reserve.

Kareiva, Peter, Heather Tallis, Taylor H. Ricketts, Gretchen C. Daily, and Stephen Polasky (editors). 2011. *Natural Capital: Theory and Practice of Mapping Ecosystem Services*. Oxford, UK: Oxford University Press.

Hartwick, John M. and Nancy D. Olewiler. 1998. *The Economics of Natural Resource Use* (2nd edition). Reading, MA: Addison-Wesley.

Outline and Reading List[2]

I. Introduction (August 29, 31 and September 2)

Hartwick and Olewiler, Chapter 1.

The Economist. 2001. No Title: Why the Poor Need Property Rights. (March 31): 20-22.

Goodnough, Abby. 2009. In Maine, Tensions Over Ailing Lobster Industry *The New York Times* (August 22).

Perloff, Jeffrey M. 2009. Compensating and Equivalent Variation and Consumer Surplus. In Supplemental Material to accompany Chapter 9 of Microeconomics, 5th ed. Pearson-Addison Wesley.

Nordhaus, William. 2007. Critical Assumptions in the Stern Review on Climate Change *Science* 317 (July 13) 201-202.

Tol, Richard S.J. 2009. The Economic Effects of Climate Change *Journal of Economic Perspectives* 23(2) 29-51.

Tol, Richard S.J. 2014. Correction and Update: The Economic Effects of Climate Change *Journal of Economic Perspectives* 28(2) 221-225.

---

[1] For more information see: http://www.reed.edu/academic/gbook/comm_pol/acad_conduct.html

[2] Readings marked with a * are optional.

*Arrow, Kenneth et al. 2014. Should Governments Use a Declining Discount Rate in Project Analysis? *Review of Environmental Economics and Policy* 8(2) 145-163.

*Dasgupta, Partha. 2008. Discounting Climate Change *Journal of Risk and Uncertainty* 37: 141-169.

*Heal, Geoffrey. 2009. Climate Economics: A Meta-Review and Some Suggestions for Future Research *Review of Environmental Economics and Policy* 3(1): 4-21.

*Portney, Paul R. and John P. Weyant (eds.). 1999. *Discounting and Intergenerational Equity* Washington, D.C.: Resources for the Future.

*Stern, Nicholas. 2007. *The Economics of Climate Change: The Stern Review*. Cambridge and New York: Cambridge University Press.

*Weitzman, Martin. 1998. Why the Far-Distant Future Should Be Discounted At Its Lowest Possible Rate *Journal of Environmental Economics and Management* 36: 201-208.

II. Sustainability and Resource Scarcity (September 7 and 9)

Hartwick and Olewiler, Chapter 2.

Christensen, Jon. 2005. Are We Consuming Too Much? *Conservation In Practice* 6(2).

Heal, Geoffrey. 2012. Reflections—Defining and Measuring Sustainability *Review of Environmental Economics and Policy* 6(1): 147-163.

UNU-IHDP and UNEP. 2014. *Inclusive Wealth Report 2014*: Measuring Progress Toward Sustainability. Summary for Decision-Makers Bonn: UNU-IHDP.

Lomborg. Bjorn. 2012. Environmental Alarmism, Then and Now: The Club of Rome's Problem--and Ours *Foreign Affairs* 91(4): 24-40.

Kiel, Katherine, Victor Matheson, Kevin Golembiewski. 2010. Luck of Skill? An Examination of the Ehrlich-Simon Bet *Ecological Economics* 69: 1365-1367.

Lawn, Philip. 2010. On the Ehrlich-Simon Bet: Both Were Unskilled and Simon Was Lucky *Ecological Economics* 69: 2045-2046.

*Arrow, K. et al. 2004. Are We Consuming Too Much? *Journal of Economic Perspectives* 18(3): 147-172.

*El Serafy, Salah. 1997. Green Accounting and Economic Policy *Ecological Economics* 21: 217-229.

*Lange, Glenn-Marie. 2003. Policy Applications of Environmental Accounting *Environmental Economics Series Paper No. 88 The World Bank Environment Department* (January).

*Nordhaus, William D., Robert N. Stavins and Martin L. Weitzman. 1992. Lethal Model 2: The Limits to Growth Revisited *Brookings Papers on Economic Activity* 2: 1-59.

*Perrings, Charles. 1998. Policy Forum: Environmental Scares - the Club of Rome Debate Revisited *Environment and Development Economics* 3: 491-537.

*Slade, Margaret. 1982. Trends in Natural-Resource Commodity Prices: An Analysis of the Time Domain *Journal of Environmental Economics and Management* 9: 122-137.

*Solow, Robert. 1993. An Almost Practical Step Toward Sustainability *Resources Policy* (September) 162-172.

III. Introduction to Ecosystem Services (September 12)

Daily, Gretchen C., Peter M. Kareiva, Stephen Polasky, Taylor H. Ricketts, and Heather Tallis. 2011. Mainstreaming Natural Capital Into Decisions. Chapter 1 in *Natural Capital: Theory and Practice of Mapping Ecosystem Services*.

Goulder, Lawrence H. and Donald Kennedy. 2011. Interpreting and Estimating the Value of Ecosystem Services. Chapter 2 in *Natural Capital: Theory and Practice of Mapping Ecosystem Services*.

Tallis, Heather and Stephen Polasky. 2011. Assessing Multiple Ecosystem Services: An Integrated Tool for the Real World. Chapter 3 in *Natural Capital: Theory and Practice of Mapping Ecosystem*.

*Bockstael, Nancy E., A. Myrick Freeman, III, Raymond J. Kopp, Paul R. Portney, and V. Kerry Smith. 2000. On Measuring Economic Values for Nature *Environmental Science & Technology* 34(8): 1384-1389.

*Boyd, James and Spencer Banzhaf. 2007. What are Ecosystem Services? The Need for Standardized Environmental Accounting Units *Ecological Economics* 63(2-3): 616-626.

*Boyd, James, Paul Ringold, Alan Krupnick, Rob Johnston, Matthew A. Weber and Kim Hall. 2014. Ecosystem Services Indicators: Improving the Linkage Between Biophysical and Economic Analysis *International Review of Environmental and Resource Economics* 8: 359-443.

*National Academies of Sciences. 2004. Executive Summary: Valuing Ecosystem Services: Toward Better Environmental Decision-Making Washington, DC: National Academies Press. Pages 1-16.

*National Academies of Sciences. 2004. Translating Ecosystem Functions to the Value of Ecosystem Services: Case Studies Washington, DC: National Academies Press. Pages 156-178.

IV. Land (September 14 and 16)

Hartwick and Olewiler, Chapter 3 (pages 57-75)

Ashenfelter, Orley and Karl Storchmann. 2016. The Economics of Wine, Weather, and Climate Change *Review of Environmental Economics and Policy* 10(1): 35-46.

McConnell, Virginia and Margaret Walls. 2009. U.S. Experience with Transferable Development Rights *Review of Environmental Economics and Policy* 3(2): 288-303.

*Egan, Lorraine M. and Myles J. Watts. 1998. Some Costs of Incomplete Property Rights with Regard to Federal Grazing Permits *Land Economics* 74(2): 171-185.

*Phillips, Justin and Eban Goodstein. 2000. Growth Management and Housing Prices: The Case of Portland, Oregon *Contemporary Economic Policy* 18(3): 334-344.

V. Water (September 19 and 21)

Hartwick and Olewiler, Chapter 3 (pages 75-end).

Olmstead, Sheila M. 2010. The Economics of Water Quality. *Review of Environmental Economics and Policy.* 4(1): 44-62.

Olmstead, Sheila M. 2010. The Economics of Managing Scarce Water Resources *Review of Environmental Economics and Policy.* 4(2): 179-198.

Grafton, R. Quentin, Gary Libecap, Samuel McGlennon, Clay Landry, and Bob O'Brien. 2011. An Integrated Assessment of Water Markets: A Cross-Country Comparison *Review of Environmental Economics and Policy* 5(2): 219-239.

Barba, Alisa. 2007. Struggling Over Water Series. *National Public Radio* (June 11).

PBS Video. 1997. *Cadillac Desert: An American Nile (video 2).*

*Baerenklau, Kenneth A., Kurt A. Schwabe, and Ariel Dinar. 2014. The Residential Water Demand Effect of Increasing Block Rate Water Budgets *Land Economics* 90(4): 683-699.

*Brewer, Jedidiah, Robert Glennon, Alan Ker and Gary Libecap. 2007. Transferring Water in the American West: 1987-2005 *University of Michigan Journal of Law Reform* 40(4): 1021-1053.

*Choe, KyeongAe, Dale Whittington, and Donald T. Lauria. 1996. The Economic Benefits of Surface Water Quality Improvements in Developing Countries: A Case Study of Davao, Philippines *Land Economics* 72(4): 519-537.

*Convery, Frank J. 2013. Reflections—Reshaping Water Policy: What Does Economics Have to Offer? *Review of Environmental Economics and Policy* 7(1): 156-174.

*Griffiths, Charles, Heather Klemick, Matt Massey, Chris Moore, Steve Newbold, David Simpson, Patrick Walsh, and William Wheeler. 2012. U.S. Environmental Protection Agency Valuation of Surface Water Quality Improvements *Review of Environmental Economics and Policy* 6(1): 130-146.

*Neuman, Janet C. 2004. The Good, The Bad, and The Ugly: The First Ten Years of the Oregon Water Trust *Nebraska Law Review* 83:432-484.

*Young, Robert A. 2005. *Determining the Economic Value of Water: Concepts and Methods* Washington, DC: Resources for the Future.

VI. Fisheries

A. Introduction to Fisheries (September 23)

Worm, Boris et al. 2006. Impacts of Biodiversity Loss on Ocean Ecosystem Services *Science* 314 (5800): 787-790.

Dean, Cornelia. 2006. Study Sees 'Global Collapse' of Fish Species *The New York Times* (November 3).

Howe, Kevin. 2006. Oceans' Early Demise Disputed: Fishers, Other Marine Experts Say Pessimistic Report Unduly Alarmist *Monetery County Herald* (November 11).

Worm, Boris, et al. 2009. Rebuilding Global Fisheries *Science* 325 (5940) 578-585.

UN FAO. 2016. *The State of the World Fisheries and Aquaculture: 2016.* Part 1: World Review of Fisheries and Aquaculture. FAO Fisheries and Aquaculture Department Rome, Italy.

*Garcia, S.M. and C. Newton. 1997. Current situation, trends, and prospects in world capture fisheries. Pages 3-27 in E.L. Pikitch, D.D. Huppert, and M.P. Sissenwine, editors. *Global Trends: Fisheries Management*.

* The Oregon Story: Fishing *Oregon Public Broadcasting* (video)

B. Theory of Fisheries (September 26, 28 and 30)

Hartwick and Olewiler, Chapter 4.

Grafton, R.Q., T. Kompas and R.W. Hilborn. 2007. The Economics of Overexploitation Revisited *Science* 318: 1601.

*Gordon, H. Scott. 1954. The Economic Theory of a Common Property Resource: The Fishery *The Journal of Political Economy* 62(2) 124-142.

*Iudicello, Suzanne, Michael Weber, and Robert Wieland. 1999. *Fish, Markets and Fishermen: The Economics of Overfishing* Washington, DC: Island Press. Chapters 1-3.

C. Regulating Fisheries (October 3 and 5)

Hartwick and Olewiler, Chapter 5.

Dietz, Thomas, Elinor Ostrom, and Paul C. Stern. 2003. The Struggle to Govern the Commons *Science* 302: 1907-1912.

Iudicello et al. *Fish, Markets and Fishermen: The Economics of Overfishing*, Chapter 4: The Effects of Subsidies.

Sutinen, J. G. and J.R. Gauvin. 1989. An Econometric Study of Regulatory Enforcement and Compliance in the Commercial Inshore Lobster Fishery of Massachusetts. Pages 415-428 in P.A. Neher, R. Arnason and N. Mollett, editors. *Rights Based Fishing*. Boston, MA: Kluwer Academic Publishers.

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

*Bromley, Daniel W. (editor) 1992. *Making the Commons Work: Theory, Practice, and Policy*. Institute for Contemporary Studies: San Francisco, CA.

*Farrow, S. 1996. Marine Protected Areas: Emerging Economics *Marine Policy*. 20 (6): 439-446.

*Holland, D.S. and R. J. Brazee. 1996. Marine Reserves for Fisheries Management *Marine Resource Economics*. 11: 157-171.

*Iudicello et al. *Fish, Markets and Fishermen: The Economics of Overfishing*, Chapter 5: Managing Fisheries Rationally: Framework and Tools.

*Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press.

*Smith, Martin D. and James E. Wilen. 2002. The Marine Environment: Fencing the Last Frontier *Review of Agricultural Economics* 24 (1) 31-42.

D. Project Day (October 7)

E. Quotas and Cooperatives (October 10 and 12)

Major, P. 1997. A Government Perspective on New Zealand's Experience with ITQs. Pages 264-269 in E.L. Pikitch, D.D. Huppert, and M.P. Sissenwine, editors. *Global trends: fisheries management*. American Fisheries Society Symposium 20. Bethesda, Maryland.

Bromley, Daniel W. 2009. Abdicating Responsibility: The Deceits of Fisheries Policy. *Fisheries* 34(6) 280-290. Also read the Letters to the Editor and Bromley's response.

Wilen, James E., Jose Cancino, and Hirotsugu Uchida. 2012. The Economics of Territorial Use Rights Fisheries, or TURFs *Review of Environmental Economics and Policy* 6(2): 237-257.

Deacon, Robert T. 2012. Fishery Management by Harvester Cooperatives *Review of Environmental Economics and Policy* 6(2): 258-277.

*Arnason, Ragnar. 2012. Property Rights in Fisheries: How Much Can Individual Transferable Quotas Accomplish? *Review of Environmental Economics and Policy* 6(2): 217-236.

*Casey, K.E., C.M. Dewees, B.R. Turris, and J.E. Wilen. 1995. The Effects of Individual Vessel Quotas in the British Columbia Halibut Fishery *Marine Resource Economics*. 10 (3): 211-230.

*Chiu, Cindy. 2009. Thirty Years Later: The Global Growth of ITQs and Their Influence on Stock Status in Marine Fisheries *Fish and Fisheries* 10: 217-230.

*Ecotrust Canada. 2009. A Cautionary Tale About ITQs in BC Fisheries. Briefing 8.

*Iudicello et al. *Fish, Markets and Fishermen: The Economics of Overfishing*, Chapter 6: Case Studies.

*Kitts, Andrew W. and Steven F. Edwards. 2003. Cooperatives in U.S. Fisheries: Realizing the Potential of the Fishermen's Collective Marketing Act *Marine Policy* 27: 357-366.

Midterm Examination: Friday, October 14th

VII. Environmental Resources

A. Theory and Policies (October 24 and 26)

Hartwick and Olewiler, Chapter 6.

*Coase, Ronald H. 1960. The Problem of Social Cost. *Journal of Law and Economics* 3: 1-44.

*Hahn, Robert W. 2009. Greenhouse Gas Auctions and Taxes: Some Political Economy Considerations *Review of Environmental Economics and Policy* 3(2): 167-188.

*Scarborough, Brandon. 2007. Trading Forest Carbon: A Panacea or Pipe Dream to Address Climate Change? (July) *PERC Policy Series* Issue Number PS-40.

B. Project Day (November 2)

C. Applications (October 28, 31 and November 4)

Hartwick and Olewiler, Chapter 7

Loomis, John B. 1996. How Large is the Extent of the Market for Public Goods: Evidence From a Nationwide Contingent Valuation Survey *Applied Economics* 28: 779-782.

Netusil, Noelwah R., Michael Kincaid, and Heejun Chang. 2014. Valuing Water Quality in Urban Watersheds: A Comparative Analysis of Johnson Creek, Oregon and Burnt Bridge Creek, Washington *Water Resources Research* 50(5): 4254-4268.

Johnston, Robert J., Thomas A. Grigalunas, James J. Opaluch, Marisa Mazzotta, and Jerry Diamantedes. 2002. Valuing Estuarine Resource Services Using Economic and Ecological Models: The Peconic Estuary System Study *Coastal Management* 30(1): 47-65.

Davis, Lucas W. 2008. The Effect of Driving Restrictions on Air Quality in Mexico City *Journal of Political Economy* 116(1): 38-81.

*Bell, Kathleen, Daniel Huppert, and Rebecca Johnson. 2003. Willingness to Pay for Local Coho Salmon Enhancement in Coastal Communities *Marine Resource Economics* 18(1): 15-32.

*Diamond, Peter A. and Jerry A. Hausman. 1994. Contingent Valuation: Is Some Number Better than No Number? *Journal of Economic Perspectives* 8 (Fall) 45-64.

*Freeman, A. Myrick. 2003**.** *The Measurement of Environmental and Resource Values: Theories and Methods* (2nd edition). Washington, D.C.: Resources for the Future.

*Hanemann, W. Michael. 1994. Valuing the Environment Through Contingent Valuation *Journal of Economic Perspectives* 8 (Fall) 19-43.

*Huppert, Daniel D. 1999. Snake River Salmon Recovery: Quantifying the Costs *Contemporary Economic Policy* 17 (4): 476-491.

*Kelman, Steven. Cost-Benefit Analysis: An Ethical Critique. Pages 129-136 in Glickman and Gough (eds.), *Readings in Risk*.

*Layman, R. C., J. R. Boyce, and K. R. Criddle. 1996. Economic Valuation of the Chinook Salmon Sport Fishery of the Gulakana River, Alaska, Under Current and Alternate Management Plans *Land Economics* 72 (1): 113-128.

*Murdoch, William, Stephen Polasky, Kerrie A. Wilson, Hugh P. Possingham, Peter Kareiva, and Rebecca Shaw. 2007. Maximizing Return on Investment in Conservation *Biological Conservation* 139: 375-388.

*Portney, Paul R. 1994. The Contingent Valuation Debate: Why Economists Should Care *Journal of Economic Perspectives* 8 (Fall) 3-17.

D. Distributional Consequences of Policy Choices (November 7)

Fullerton, Don and Daniel Karney. 2009. Does Environmental Protection Hurt Low-Income Families? *AERE Newsletter* 29(1): 27-32.

Maguire, Kelly and Glenn Sheriff. 2011. Comparing Distributions of Environmental Outcomes for Regulatory Environmental Justice Analysis *International Journal of Environmental Research and Public Health* 8: 1707-1726.

Tallis, Heather, Stefano Pagiola, Wei Zhang, Sabina Shaikh, Erik Nelson, Charlotte Stanton, and Priya Shyamsundar. 2011. Poverty and the Distribution of Ecosystem Services. Chapter 16 in *Natural Capital: Theory and Practice of Mapping Ecosystem Services*.

VIII. Nonrenewable Resources & Recycling

A. Theory (November 9, 11 and 14)

Wick, Katherina and Erwin Bulte. 2009. The Curse of Natural Resources *Annual Review of Resource Economics* 1 (October).

Hartwick and Olewiler, Chapters 8 and 9.

Livernois, John. 2009. On the Empirical Significance of the Hotelling Rule *Review of Environmental Economics and Policy* 3(1): 22-41.

Jensen, Svenn, Kristina Mohlin, Karen Pittel, and Thomas Sterner. 2015. An Introduction to the Green Paradox: The Unintended Consequences of Climate Policies *Review of Environmental Economics and Policy* 9(2): 246-265.

*Brown, Stephen P.A. and Daniel Wolk. 2000. Natural Resource Scarcity and Technological Change. *Economic and Financial Review*, Federal Reserve Bank of Dallas (First Quarter) 2-13.

*Slade, Margaret E. and Henry Thille. 2009. Whither Hotelling: Tests of the Theory of Exhaustible Resources. *Annual Review of Resource Economics*

*van der Ploeg, Frederick and Cees Withagen. 2012. Is There Really a Green Paradox? *Journal of Environmental Economics and Management* 64: 342-363.

B. Application: Recycling (November 16)

Tierney, John. 1996. Recycling is Garbage *The New York Times Magazine* (June 30) 24- 29.

Kinnaman, Thomas C. 2014. Understanding the Economics of Waste: Drivers, Policies, and External Costs *International Review of Environmental and Resource Economics* 8: 281-320.

*Denison, Richard A. and John F. Ruston. Recycling is not Garbage *Technology Review* (October): 56-60.

*Kinnaman, Thomas C. 2006. Policy Watch: Examining the Justification for Residential Recycling *Journal of Economic Perspectives* 20(4): 219-232.

*Viscusi, W. Kip, Joel Huber, and Jason Bell. 2012. Alternative Policies to Increase Recycling of Plastic Water Bottles in the United States *Review of Environmental Economics and Policy* 6(2): 190-211.

IX. Energy

A. Government Policies (November 18)

Krupnick, Alan J., Ian W.H. Parry, Margaret Walls, Tony Knowles, and Kristin Hayes. 2010. *Toward a New National Energy Policy: Assessing the Options.* National Energy Policy Institute and Resources for the Future (November).

Gillingham, Kenneth, David Rapson, and Gernor Wagner. 2016. The Rebound Effect and Energy Efficiency Policy *Review of Environmental Economics and Policy* 10(1): 68-88.

*Bennear, Lori S. 2015. Offshore Oil and Gas Drilling: A Review of Regulatory Regimes in the United States, United Kingdom, and Norway *Review of Environmental Economics and Policy* 9(1) 2-22.

*Borenstein, Severin. 2000. Understanding Competitive Pricing and Market Power in Wholesale Electricity Markets *The Electricity Journal* (July) 49-57.

*Borenstein, Severin and James Bushnell. 2002. Electricity Restructuring: Deregulation or Reregulation *Regulation* 23(2): 46-52.

*Convery, Frank J. 2001. Reflections—Energy Efficiency Literature for Those in the Policy Process *Review of Environmental Economics and Policy* 5(1) 172-191.

*Gillingham, Kenneth, Richard G. Newell and Karen Palmer. 2009. Energy Efficiency Economics and Policy *Annual Review of Resource Economics* 1 (Volume publication date October 2009).

*Makholm, Jeff D. Regulation of Natural Gas in the United States, Canada, and Europe: Prospects for a Low Carbon Fuel *Review of Environmental Economics and Policy* 107-127.

B. Oil and Energy Prices (November 21)

Deffeyes, K.S. Hubbert's Peak: The Impending World of Oil Shortage. Princeton, NJ: Princeton University Press. Chapter 1.

Maugeri, Leonardo. 2009. Understanding Oil Price Behavior through an Analysis of a Crisis *Review of Environmental Economics and Policy* 3(2): 147-166.

Fouquet, Roger. 2011. Divergences in Long-Run Trends in the Prices of Energy and Energy Services *Review of Environmental Economics and Policy* 5(2): 196-218.

Neumann, Anne and Christian von Hischhausen. 2015. Natural Gas: An Overview of a Lower-Carbon Transformation Fuel *Review of Environmental Economics and Policy* 9(1) 64-84.

*Fouquet, Roger. 2014. Long-Run Demand for Energy Services: Income and Price Elasticities over Two Hundred Years *Review of Environmental Economics and Policy* 8(2) 186-207.

*Toth, Ferenc L. and Hans-Holger Rogner. 2006. Oil and Nuclear Power: Past, Present and Future *Energy Economics* 28: 1-25.

C. Renewables (November 23)

Heal, Geoffrey. 2010. Reflections—The Economics of Renewable Energy in the United States *Review of Environmental Economics and Policy* 4(1): 139-154.

Schmalensee, Richard. 2012. Evaluating Policies to Increase Electricity Generation from Renewable Energy *Review of Environmental Economics and Policy* 6(1): 45-64.

*Aleklett, K. and C.J. Campbell. 2003. The Peak and Decline of World Oil and Gas Production *Minerals and Energy – Raw Materials Report* 18(1): 5-20.

*Jacobson, Mark Z. 2009. Review of Solutions to Global Warming, Air Pollution, and Energy Security *Energy & Environmental Science* 2:148-173.

*Kosnick, Lea. 2010. Balancing Environmental Protection and Energy Production in the Federal Hydropower Licensing Process *Land Economics* 86(3): 444-466.

*Palmer, Karen and Dallas Burtraw. 2005. Cost-Effectiveness of Renewable Electricity Policies *Energy Economics* 27: 873-894.

*Sawhney, Aparna. 2013. Renewable Energy Policy in India: Addressing Energy Poverty and Climate Mitigation *Review of Environmental Economics and Policy* 7(2) 296-312.

X. Forestry

A. Theory (November 28 and 30)

Hartwick and Olewiler, Chapter 10 (pages 307-325)

Englin, Jeffrey. 1990. Backcountry Hiking and Optimal Timber Rotation *Journal of Environmental Management* 31:97-105.

Creedy, J. and A. D. Wurzbacher. 2001. The Economic Value of a Forested Catchment with Timber, Water and Carbon Sequestration Benefits *Ecological Economics* 38: 71-83.

B. Applications (December 2)

Hartwick and Olewiler, Chapter 10 (pages 325-end).

Oregon Public Broadcasting. The Oregon Story: Rethinking the Forests (video).

Brown, G.M. and Shogren J.F. 1998. Economics of the Endangered Species Act *Journal of Economic Perspectives* 12(3): 3-20.

*Angelsen, Arlid and David Kaimowitz. 1999. Rethinking the Causes of Deforestation: Lessons from Economic Models *The World Bank Research Observer* 14(1): 73-98.

*Clawson, M. 1979. Forests in the Long Sweep of American History. *Science* 204: 1168-1174. Pages 229-236 in R. A. Sedjo, editor *Economics of Forestry*. Ashgate Press, Burlington: VT.

*Ferraro, Paul J., Kathleen Lawlor, Katrina L. Mullan, and Subhrendu K. Pattanayak. 2012. Forest Figures: Ecosystem Services Valuation and Policy Evaluation in Developing Countries *Review of Environmental Economics and Policy* 6 (1) 20-44.

*Harrison, S., J. Bennett and C. Tisdell. 2002. The Role of Non-Market Valuation in Forest Management and Recreation Policy *Economic Analysis and Policy* 32 (2): 1-10.

*Kerr, Suzi C. 2013. The Economics of International Policy Agreements to Reduce Emissions from Deforestation and Degradation *Review of Environmental Economics and Policy* 7 (1) 47-66.

*Montgomery, C. A., G. M. Brown, Jr. and D. M. Adams. 1994. The Marginal Cost of Species Preservation: the Northern Spotted Owl. *Journal of Environmental Economics and Management*. 26: 111-128. Pages 429-446 in R. A. Sedjo, editor *Economics of Forestry*. Ashgate Press, Burlington: VT.

*Rose, S. K. and D. Chapman. 2003. Timber harvest adjacency economies, hunting, species protection, and old growth value: seeking the dynamic optimum *Ecological Economics*. 44: 325-344.

*Simpson, R. D., R. A. Sedjo and J. W. Reid. 1996. Valuing biodiversity for use in pharmaceutical research. *Journal of Political Economy*. 104: 163-185. Pages 447-470 in R. A. Sedjo, editor *Economics of Forestry*. Ashgate Press, Burlington: VT.

*Shyamsundar, Priya and Rucha Ghate. 2014. Rights, Rewards, and Resources: Lessons from Community Forestry in South Asia *Review of Environmental Economics and Policy* 8 (1) 80-102.

*Wolf, Robert E. 1989. National Forest Timber Sales and the Legacy of Gifford Pinchot: Managing a Forest and Making it Pay *University of Colorado Law Review* 60: 1037-1078.

XI. Presentations (December 5 and 7)