Department of Economics
Course Outline

		Term:	Fall 2008
Course:	Economics 675 [Advanced Issues in Resource Economics]	**Section:**	01
Time:	MW 13:00 – 14:15	**Place:**	SS 423 (subject to change)
Instructor:	Dr. John R. Boyce		
Office:	SS 412	**Telephone.:**	220-5860
Office Hours:	TBA	**E-mail:**	boyce@ucalgary.ca

Textbook(s):

N/A

Book(s) on Reserve: None

Course Outline:

1. Review of Basic Issues in Natural Resource Economics (2 weeks)
   a. Optimal control theory
   b. Dynamic programming
   c. Differential & Markov games

2. Exhaustible Resources (4 weeks)
   a. Perfect competition, fixed stock
   b. Imperfect competition, fixed stock
   c. Exploration and mixed stocks
   d. Pollution and Global Warming
   e. Taxation & regulation

3. Renewable Resources (4 weeks)
   a. Perfect competition, full property rights
   b. Imperfect competition, full property rights
   c. Common property & open access
   d. Extinction
   e. Regulation

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4. Other Applications (3 weeks)
   a. Forests, Water, and Land
   b. Environmental Kuznet's Curve
   c. Curse of Natural Resources

Grade Determination and Final Examination Details:

Four Assignments	10% Each (40% total)
Two Examinations	20% Each (40% total)
Term Paper	25% (first draft, 5%, final draft 15%)

Examinations and assignments are marked on a numerical (percentage) basis. The letter grade is calculated using the following letter grade equivalences:

A+	98 – 100	B	80 – 84	C-	60 – 64
A	95 – 97	B-	75 – 79	D+	55 – 59
A-	90 – 94	C+	70 – 74	D	50 – 54
B+	85 – 89	C	65 – 69	F	<50

The term paper shall consist of a literature review, empirical modeling, or theoretical modeling. The first Draft is due first class meeting in March. Final draft is due one week before the last day of classes.

If the distribution of grades determined using the aforementioned conversion chart appears to be abnormal the instructor reserves the right to change the grade conversion chart if the instructor, *at the instructor's discretion*, feels it is necessary to more fairly represent student achievement.

READING LIST

Papers marked with an asterisk are recommended readings (about 3 to 4 per week).

EXHAUSTIBLE RESOURCE READINGS

Basic Models of Exhaustible Resource Use

GRAY, LEWIS CECIL (1914), "Rent under the assumption of Exhaustibility," *Quarterly Journal of Economics*, 28 (May) 466-489.

HOTELLING, HAROLD A. (1931), "Economics of Exhaustible Resources," *Journal of Political Economy* 39 (April) 137-175.

*SOLOW, ROBERT M. (1974), "The economics of resources, or the resources of Economics," *American Economic Review*, 64 (May) 1-14.

*SMITH, VERNON L. (1968), "Economics of Production from Natural Resources," *American Economic Review*, 58 (June), 409-431.

SALANT, STEPHEN, MUKESH ESWARAN, AND TRACY LEWIS (1983), "The Length of Optimal Extraction Programs When Depletion Affects Extraction Costs," *Journal of Economic Theory*, 31: 364-374.

SOLOW, ROBERT M., AND F. Y. WAN (1976), "Extraction Costs in the Theory of Exhaustible Resources," *Bell Journal of Economics*, 7 (Autumn), 359-370.

*STIGLITZ, JOSEPH E. (1974), "Optimal growth with exhaustible Resources," *Review of Economic Studies*, 41: 123-127.

STIGLITZ, JOSEPH E. (1976), "Monopoly extraction of an exhaustible resource," *American Economic Review*, 66 (September): 655-661.

WEINSTEIN, MARTIN C., AND R. J. ZECKHAUSER (1975), "The Optimal Consumption of Depletable Natural Resources," *Quarterly Journal of Economics*, 89 (August), 371-392.

*HARTWICK, JOHN M. (1977), "A Savings rule for Exhaustible Resources," *American Economic Review*, 67 (5): 972-974.

ARROW, KENNETH J., AND SHELDON CHANG (1982), "Optimal pricing, Use, and Exploration of Uncertain Resource Stocks," *Journal of Environmental Economics and Management*, 9: 1-10.

*SWIERZBINSKI, JOSEPH E., AND ROBERT MENDELSOHN (1989), "Exploration and Exhaustible Resources: The Microfoundations of Aggregate Models," *International Economic Review*, 30 (February), 175-186.

LIVERNOIS, JOHN, AND RUSSELL UHLER (1987), "Extraction Costs and the Economics of Nonrenewable Resources," *Journal of Political Economy*, 95 (February), 195-203.

*SLADE, MARGARET E. (1982), "Trends in Natural-Resource Commodity Prices: An Analysis of the Time Domain," *Journal of Environmental Economics and Management,* 9(June), 122-37.

KRAUTKRAEMER, JEFFERY A. (1998), "Nonrenewable resource scarcity," *Journal of Economic Literature*, XXXVI (4): 2065-2107.

FARZIN, Y. H. (1992), "The Time Path of Scarcity Rent in the Theory of Exhaustible Resources," *Economic Journal*, 102 (July), 813-830.

*SMULDERS, SJAK, AND MICHIEL DE NOOJI (2003), "The impact of energy conservation on technology and economic growth," *Resource and Energy Economics*, 25: 59-79.

Strategic Models of Exhaustible Resources

*ESWARAN, MUKESH, AND TRACY R. LEWIS (1985), "Exhaustible resources and alternative equilibrium concepts," *Canadian Journal of Economics*, 18: 459-3.

*REIGNANUM, JENNIFER F., AND NANCY L. STOKEY (1985), "Oligopoly extraction of a non-renewable common property resource: the importance of the period of commitment in dynamic games," *International Economic Review*, 26 (1), 161-73.

SALANT, STEPHEN (1976), "Exhaustible Resources and Industrial Structure: A Nash-Cournot Approach to the World Oil Market," *Journal of Political Economy*, 84 (Oct.), 1079-93.

LOURY, GLENN (1986), "A theory of 'oil'igopoly: Cournot equilibrium in exhaustible resource markets with fixed supplies, *International Economic Review*, 27, 285-301.

*POLASKY, STEPHEN, (1992), "Do oil producers act as 'oil'ogopolists?" *Journal of Environmental Economics and Management*, 23, 247-262.

BOYCE, JOHN R., AND LUCIA VOJTASSAK (2008), "Resource and Energy Economics."

NEWBERRY, DAVID, AND ERIC MASKIN (1993), "Disadvantageous Oil Tariffs and Dynamic Consistency," *American Economic Review* 80 (March), 143-156.

*VOJTASSAK, LUCIA, JOHN R. BOYCE, AND JEFFREY CHURCH, "Capacity Constraints as a Commitment Device in Dynamic Pipeline Rent Extraction," University of Calgary, November 2006.

GROOT, F., ET AL. (1992), "Note on the Open-Loop von Stackelberg Equilibrium in the Cartel versus Fringe Model," *Economic Journal*, 102 (November), 1478-84.

JOHANNES HORNNER, AND MORTON KAMIEN, "Coase and Hotelling: A Meeting of Minds," *Journal of Political Economy*, 112 (3): 718-723.

Regulation of Exhaustible Resources

*LIBECAP, GARY D., AND STEVEN N. WIGGINS (1985), "Oil field unitization: contractual failure in the presence of imperfect information," *American Economic Review*, 75 (June), 368-85.

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*LIBECAP, GARY D., AND STEVEN N. WIGGINS (1985), "The Influence of Private Contractural Failure on Regulation: the Case of Oil Field Unitization," *Journal of Political Economy*, (August), 690-714.

KARP, LARRY (1992), "Efficiency Inducing Tax for a Common Property Oligopoly," *Economic Journal*, 102 (March), 321-332.

DEACON, ROBERT T. (1993), "Taxation, Depletion, and Welfare: A Simulation Study of the U.S. Petroleum Resource," *Journal of Environmental Economics and Management,* 24: 159-187.

BURNESS, HAROLD S. (1976), "On the Taxation of Nonreplenishible Natural Resources," *Journal of Environmental Economics and Management*, 3: 289-311.

YUCEL, M. K. (1989), "Severance Taxes and Market Structure in an Exhaustible Resource Industry," *Journal of Environmental Economics and Management*, 16: 134-148.

*BOHN, H., AND ROBERT T. DEACON (2000), "Ownership risk, investment, and the use of natural resources," *American Economic Review*, 90 (June): 526-49.

*BOYCE, JOHN R., AND LINDA NOSTBAKKEN, "An efficient dynamic contracting equilibrium in oil and gas field exploration and development," University of Calgary, October 2006.

Pollution and Exhaustible Resources

HAHN, ROBERT W. (2000), "The Impact of Economics on Environmental Policy," *Journal of Environmental Economics & Management*, 39 (May): 375-99.

HAHN, ROBERT W. (1989), "Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders," *Journal of Economic Perspectives*, 3 (Spring): 95-114.

CARLSON, C., ET AL. (2000), "Sulfur Dioxide Control by Electric Utilities: What Are the Gains from Trade?," *Journal of Political Economy*, 108 (6) 1292-1326.

*JOSKOW, PAUL, RICHARD SCHMALENSEE, AND ELIZABETH BAILY (1998), "The market for SO2 permits," *American Economic Review*, 88 (September), 669-685.

STAVINS, ROBERT N. (1999), "The Costs of Carbon Sequestration: A Revealed-Preference Approach," *American Economic Review*, 89 (4) 994-1009.

*NORDHAUS, WILLIAM. (1991), "To Slow or Not to Slow: The Economics of the Greenhouse Effect," *Economic Journal*, 101(July), 920-37.

HOEL, MICHAEL (1993), "Intertemporal Properties of an International Carbon Tax," *Resource and Energy Economics*, 15 (March), 51-70.

*FARZIN, Y. H., AND O TAHVOVEN (1996), "Global Carbon Cycle and the Time Path of the Optimal Carbon Tax," *Oxford Economic Papers*, 48 (October) 515-537. …/6

NORDHAUS, WILLIAM. (1993), "Optimal Greenhouse Gas Reductions and Tax Policy in the "Dice" Model," *American Economic Review*, 83 (2): 313-17.

CHAKRAVORTY, U., JAMES ROUMASSET, AND K. TSE (1997), "Endogenous Substitution among Energy Resources and Global Warming," *Journal of Political Economy*; 105 (6): 1201-34.

*GROSSMAN, GENE M., AND ALAN KREUGER (1995), "Economic growth and the Environment," *Quarterly Journal of Economics*, 110 (May) 153-177.

STOKEY, NANCY L. (1998), "Are there Limits to Growth?" *International Economic Review*, 39 (February) 1-31.

*BROCK, WILLIAM A., AND M. SCOTT TAYLOR (2004), "The Green Solow Model", NBER Working Paper 10577.

RENEWABLE RESOURCE READINGS

Static Models of Renewable Resource Extraction

*GORDON, H. SCOTT (1954), "The economic theory of a common-property resource: the fishery," *Journal of Political Economy*, 62 (April), 124-42.

*SCOTT, ANTHONY (1955), "The fishery: the objectives of sole ownership," *Journal of Political Economy*, 63 (April), 116-24.

COPES, PARCIVAL (1970), "The back-wards bending supply curve in a fishery." *Scottish Journal of Political Economy*; 17 (Feb.), 69-77.

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): 211-30.

Dynamic Models of Renewable Resource Extraction

*SMITH, VERNON L. (1968), "Economics of Production from Natural Resources," *American Economic Review*, 58 (June), 409-431.

PATTERSON, D., AND JAMES E. WILEN, (1977), "The case of the Pacific fur seal," *Economic History Review*.

*CLARK, COLIN W., AND GORDON MUNRO (1975), "The economics of fishing and modern capital theory: A simplified approach," *Journal of Environmental Economics and Management*, 2: 92-106.

CLARK, COLIN W., AND GORDON R. MUNRO (1980), "Fisheries and the Processing Sector: Some Implications for Management Policy," *Bell Journal of Economics*, 11 (Autumn), 603-616.

BROWN, GARDNER M. (1974), "An Optimal Program for Managing Common Property Resources with Congestion Externalities," *Journal of Political Economy*, 82(1): 163-73. …/7

MCKELVEY, ROBERT (1983), "The Fishery in a Fluctuating Environment: Coexistence of Specialist and Generalist Fishing Vessels in a Multipurpose Fleet," *Journal of Environmental Economics and Management*, 10 (December): 287-309.

CROPPER, MAUREEN L. et al. (1979), "The Optimal Extinction of a Renewable Natural Resource," *Journal of Environmental Economics and Management*, 6 (4): 341-49.

*BRANDER, JAMES & M. SCOTT TAYLOR (1998), "The Simple Economics of Easter Island: A Ricardo-Malthus Model of Renewable Resource Use." *American Economic Review*. 88 (March): 119-38.

BOYCE, JOHN R. (1996), "An Economic Analysis of the Fisheries Bycatch Problem," *Journal of Environmental Economics and Management*, 31: 314-36.

SANCHIRICO, JAMES N. AND JAMES E. WILEN (2005), "Optimal Spatial management of renewable resources: Matching Policy scope to ecosystem scale," *Journal of Environmental Economics and Management*, 50: 23-46.

Strategic Models of Renewable Resource Use

*LEVHARI, DAVID, AND LEONARD J. MIRMAN (1980), "The great fish war: an example using a dynamic Cournot-Nash," *Bell Journal of Economics*, 11 (Spring), 322-34.

HANNESSON, R. (1997), "Fishing as a Supergame," *Journal of Environmental Economics and Management*, 32 (March), 309-22,

BOYCE, JOHN R. (2002), "Conservation for sale." Unpublished manuscript, University of Calgary.

*KREMER, M. AND C. MORCOM (2000), "Elephants," *American Economic Review*, 90 (March), 212-34.

*BROOKS, ROBIN ET AL. (1999) "When Is the Standard Analysis of Common Property Extraction under Free Access Correct? A Game-Theoretic Justification for Non-Game-Theoretic Analyses," *Journal of Political Economy*, 107 (August), 843-58.

Regulation of Renewable Resources

CLARK, COLIN W. (1980), "Towards a predictive model for the economic regulation of commercial fisheries," *Canadian Journal of Fisheries and Aquatic Science*, 37 (July), 1111-29.

*ARNASON, RAGNAR, (1990), "Minimum information management in fisheries," *Canadian Journal of Economics*, 23 (August), 630-53.

BOYCE, JOHN R. (1992), "Individual transferable quotas and production externalities in a fishery," *Natural Resource Modeling*, 4 (Winter), 385-408.

COPES, PARZIVAL (1986) "A critical review of the individual quota as a device in fisheries management," *Land Economics*, 62 (August), 278-91.

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JOHNSON, RONALD N., AND GARY D. LIBECAP (1982), "Contracting problems and regulation: the case of the fishery," *American Economic Review*, 72 (December), 1005-22.

KARPOFF, JONATHAN M. (1987), "Suboptimal controls in common resource management: the case of the fishery," *Journal of Political Economy*, 95 (February), 179-94.

MATULICH, SCOTT C., R. C. MITTELHAMMER, AND C. REBERTE (1996), "Toward a more complete model of individual transferable fishing quotas: implications of incorporating the processing sector," *Journal of Environmental Economics and Management*, 31 (July), 112-28.

SAMUELSON, PAUL A. (1974), "Is the rent-collector worthy of his full hire?," *Eastern Economic Journal*, 1 (January), 7-10; reprinted in N. Nagatani and K. Crowley, ed., *The Collected Scientific Papers of Paul Samuelson*, Vol. 4, 1977, MIT Press, Cambridge, Mass.

HOMANS, FRANCES R., AND JAMES E. WILEN (1997), "A model of regulated open access resource use," *Journal of Environmental Economics and Management*, **32** (January): 1-21.

SWANSON, TIMOTHY (1994), "The Economics of Extinction Revisited and Revised: A Generalised Framework for the Analysis of the Problems of Endangered Species and Biodiversity Losses," *Oxford Economic Papers*, 46 (Oct.), 800-821.

BROWN, GARDNER M. (2000), "Renewable natural resource management and use without markets," *Journal of Economic Literature*, XXXVIII (4): 875-914.

*BOYCE, JOHN R. (2004), "Instrument Choice in a Fishery," *Journal of Environmental Economics and Management*.

COPELAND, BRIAN R., AND M. SCOTT TAYLOR (2005), "Trade, Tragedy, and the Commons," *Journal of Environmental Economics and Management*.

MISCELLANEOUS TOPICS

Waste & Pollution

CAPUTO, MICHAEL R.; WILEN, JAMES E. (1995), "Optimal Cleanup of Hazardous Wastes", *International Economic Review*, 36 (1): 217-43.

FULLERTON, DON, AND T. C. KINNAMAN (1996), "Household Responses to Pricing Garbage by the Bag," *American Economic Review*, 86 (4): 971-84.

*SMITH, VERNON L. (1972), "Dynamics of Waste Accumulation: Disposal Versus Recycling," *Quarterly Journal of Economics*, 86 (November) 600-616.

*FULLERTON, DON (1995), "Burning, Recycling, and Garbage," *Journal of Environmental Economics and Management*.

Water

NEGRI, DONALD H. (1989), "The Common Property Aquifer as a Differential Game," *Water Resources Research*, 25 (1): 9-15.

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GARDNER, R., M. R. MOORE, AND J. M. WALKER (1997), "Governing a Groundwater Commons: A Strategic and Laboratory Analysis of Western Water Law," *Economic Inquiry*, 35 (2): 218-34.

Forests

HARTWICK, JOHN M., LONG, NGO VAN, AND H. TIAN (2001), "Deforestation and Development in a Small Open Economy," *Journal of Environmental Economics and Management*, 41 (3): 235-51.

REED, ROBERT (1974), "OPTIMAL ROTATION OF A FOREST SUBJECT TO FIRE," *Journal of Environmental Economics and Management*.

WIRL, FRANZ (1999), "De and Reforestation: Stability, Instability and Limit Cycles," *Environmental and Resource Economics*, 14 (4): 463-79.

DEACON, ROBERT T. (1994), "Deforestation and the Rule of Law in a Cross-Section of Countries," *Land Economics* 70, 414-430.

Land

INNES, ROBERT, STEPHEN POLASKY, JOHN TSCHIRHART (1998), "Takings, Compensation and Endangered Species Protection on Private Lands," *Journal of Economic Perspectives*, 12 (3): 35-52.

POLASKY, STEPHEN, J. D. CAMM, AND B. GARBER-YONTS (2001), "Selecting Biological Reserves Cost-Effectively: An Application to Terrestrial Vertebrate Conservation in Oregon," *Land Economics*, 77 (1): 68-78.

Growth, Trade, and the Environment

*SACHS, JEFFREY D.; WARNER, ANDREW M. (2001), "The Curse of Natural Resources," *European Economic Review*, 45 (May): 827-38.

*BOYCE, JOHN R., AND J. C. HERBERT EMERY, "A Hotelling Explanation of the Curse of Natural Resources," University of Calgary, March 2006.

DASGUPTA, SUSMITA, ET AL. (2002), "Confronting the Environmental Kuznets Curve," *Journal of Economic Perspectives*, 16 (Winter): 147-68.

ANTWEILER, WERNER; COPELAND, BRIAN R.; TAYLOR, M. SCOTT (2001), "Is Free Trade Good for the Environment?" *American Economic Review*, 91 (September): 877-908

COPELAND, BRIAN R.; TAYLOR, M. SCOTT (1994), "North-South Trade and the Environment," *Quarterly Journal of Economics*, 109 (August): 755-87.

Non-programmable calculators will be allowed during the writing of tests or final examinations.

There will be a department scheduled final examination two hours in duration. It will be held in the classroom.

Tests and exams will not involve multiple choice questions.

Students' Union Vice-President, Academic
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www.ucalgary.ca/sue/

Notes:

- Students seeking reappraisal of a piece of graded term work (term paper, essay, etc.) should discuss their work with the Instructor within fifteen days of the work being returned to the class.
- It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 220-8237. Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.

Safewalk / Campus Security: 220-5333

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JRB:pst
2008-07-18