ENVIRONMENTAL RESOURCE ECONOMICS: Tentative Syllabus

Overview:
Modern economic policy analysis for both private and public sectors requires the ability to deal with current environmental challenges and regulations. We review the methods of static and dynamic optimization to deal with pollution, congestion, waste disposal and management of environmental resources including water, forests, soil, and marine. We develop the principles of sustainable development and sustainability science in contrast to popular representations. Students are encouraged to apply the basic principles to publishable research and/or to policy questions of interest. Topics include pollution as a public bad, pollution solutions, property and institutional mechanisms of environmental cooperation, sustainable economic growth, measuring the “environomy,” unsustainable recycling, conjunctive water management, policies for resource management in developing countries, and “smart,” “greedy,” and “win-win” growth.


Other references
Oates (ed.), The Economics of the Environment
Nordhaus, Nature’s Numbers

Course requirements & Grading
Midterm 24%
Final 36%
Paper 2 24%
Homework and citizenship 16%

Preliminary Course Outline Students are encouraged to indicate their preferences for topics (especially areas not already reflected below) and for readings to be added or downgraded to optional status.

I. Environmental Welfare Economics
A. Intro and “market failure”
A. Externalities (Pigouian, Coasian, and market solutions)
B. Public goods
C. Hybrids
D. Environmental justice
E. Readings
1. Perman, ch 5.
2. Welfare Economics and the Minimal Role of Government (course notes)
3. Coase, “The Problem of Social Cost,” JLE, 10/60 and in both Oates and Stavins

1 Please consult UHM schedule of courses.
2 Any topic related to course subject matter. Proposals due Sept 17 (refer to sample proposal outline from lecture). Papers due Dec 5.
3 Contributions to the learning community (including class participation, additional presentations, facilitating availability of course materials, bringing pertinent current articles, websites etc. to class’s attention).

II. Resources and Sustainability
A. Perman, ch. 1-4 & 14.
H. Heal, “Optimality or sustainability” in Festschrift for J. Stiglitz, 2003, MIT Press*

III. Pollution solutions
A. Command and control vs. emission trading
B. Emission-trading vs. exposure trading
C. Readings
1. Perman chs. 6-8
2. Montgomery (1972), JET, 5, 395-418, and ch. 12 in Oates*  
3. Roumasset and Smith, JEEM 1990; Shrestha and R'set on exposure trading*  
4. Baumol and Oates, ch 10 in Oates*  
7. Weitzman, “Prices and Quantities,” RESTUD, 10/74 and in Oates*  
14. Bovenberg and Goulder, AER, 1996*

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* When one reading is starred and another not starred in the same item, only the starred one is optional.
IV. Environmental resources (water, forests, and soil)

A. Renewable and non-renewables
B. Open access vs. common property
C. Evolution of common and private property
D. Readings

1. Perman, 14-18.
5. Harrington, ch. 32 in Oates*
6. R'set and Smith R., “Interdistrict Water Allocation w/ Conjunctive Use,” Water Resources Update, Jan '01*
12. Heal “Exhaustible Resources” The New Palgrave Dictionary of Economics*

V. Property rights, and institutional design

1. Hardin, Tragedy of the Commons, in Dorfman and Dorfman http://dieoff.org/page95.htm
2. Tietenberg, ch. 12*
3. Ostrom, E., (1990), Governing the Commons, chs. 1, 3 (pp. 69-101)*
5. Roumasset and La Croix, The Coevolution of Property Right and Political Orders: An Illustration from nineteenth-Century Hawaii*

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9. Coevolution – Mkts & Const Order (pdf); see also ch 9 in B&O (electronic)
10. Alston, Review of Anderson & Hill’s, The Not So Wild, Wild West: Property Rights on the Frontier
11. Kaiser & R’set, “Resources and Institutional Change in Hawaii"

VI. Ecological Economics, Cost-Benefit Analysis and Measurement problems
B. Perman, Part III.
E. Symposium on Contingent Valuation in Economic Perspectives, Fall 1994
2. Hanemann, W.M., Valuing the Environmental Through Contingent Valuation
G. David Chapman and Paul Portney, “Ten Years’ Later: Contingent Valuation after the Report to NOAA* *: http://www.rff.org/seminar/history.htm#11-20-02 *
H. Shogren, Economics of Invasive Species: explosive invader, in Perrings.* Olson and Roy (2002)
K. Shogren, Economics of Invasive Species: explosive invader, in Perrings.* Olson and Roy (2002)
N. Pearce and Moran, Economic Value of Biodiversity, 1994 and Pagiola et. al. (2004), How much is an ecosystem worth?,” Go to http://www.biodiversityeconomics.org/library/index.html and use the key word search function.*
Q. McFadden’s advances in CV methods (http://emlab.berkeley.edu/users/mcfadden/dlmcv10.html)*
R. Barbier&Heal, Valuing Ecosystem Services” The Economists’ Voice January 2006

VII. Win-win environmentalism


H. Wagner on green NNP  
   [http://www.env-econ.net/2005/07/from_the_answer_1.html](http://www.env-econ.net/2005/07/from_the_answer_1.html) and 

I. Does productivity growth swamp environmental degradation (Weitzman)? Implications of EKC?


K. Barrett, S., Optimal Control of Soil Erosion, ch. 18 in Dasgupta & Maler, v.2.*

L. Brock, W. and M.S. Taylor (June, 2004), “The Green Solow Model,” NBER WP 10557,  
   [http://www.nber.org/papers/w10557](http://www.nber.org/papers/w10557)

M. McConnell (Feb 1983), An Economic Model of Soil Conservation, AJAE.

N. Barbier, “The Economics of Soil Erosion: Theory, Methodology and Examples”


P. Pitafi, Pongkijvorasin, R'set, “Pricing Renewable Resource Extraction with Negative Stock Externalities.”

Q. Hoel and Karp, “Stock Pollution with Multiplicative Uncertainty,” JPubEcon,  
   [http://www.oekonomi.uio.no/memo/saertrykk/Hoel&Karp1.pdf](http://www.oekonomi.uio.no/memo/saertrykk/Hoel&Karp1.pdf)*

   *World Development, v. 32, n. 8, 1419-1439.*

S. Polasky, Economics of Biodiversity (Handbook chapter). See also  
   [http://www.apec.umn.edu/faculty/spolasky/documents/Biodiversity%207_06.pdf](http://www.apec.umn.edu/faculty/spolasky/documents/Biodiversity%207_06.pdf)

VIII. Energy, Global Warming, Growth, and International Cooperation


B. Cline, *The Economics of Global Warming* *

C. Chakravorty et.al., JPE Dec. 1997

D. Barrett, "Int. Cooperation for Environmental Protection," ch. 26 in DD*


I. Carbon taxes vs. cap and trade: references to be announced.


IX. Trade and the Environment

E. Copeland and Taylor (July, 2003), "Trade, Growth and the Environment" NBER WP

*Tentative schedule of topics

Aug 22: Critique of 1b (UFF); Thms 2a&b. Weak and strong Coase theorems
Aug 27: Weak and strong are wrong or trivially tautological. Coasean agenda/mission; blackboard economics and Cheung to the rescue; Coase thm (3a&b).
Aug 29: “Apples, Bees and Contracts,” (shrinking cores; presented by Chris); assignment: read Perman 3-4 and Bergstrom '76.
Sept 3: Labor Day
Sept 5: Thms 4a&b. Bergstrom, JPubEcon, '76 (presented by Duong). Introduction to sustainability. Assign: read Solow (unstarred one in IIF) and Arrow et al., “Are We Consuming Too Much.”
Sept 10. Starrett problems (LE not in alpha core and “fundamental nonconvexity”). First problem solved by restricting core to legal actions, e.g. cannot pollute w/o tickets (Bergstrom '75, '76). Second solved by limiting number of tickets printed, e.g. to Gmax or less. Bergstrom '76 showed that core shrinks if govt chooses the quantity of pollution, and ticket trading serves only to ensure that abatement costs are minimized. Two Johansson papers show that core shrinks (i.e., 3b and 3d go through) for bilateral spillovers. Thms 5a and 5b. Modified H, Hotelling, naive H. Hartwick satisfies weak sust and results in maximin path. Assign: Perman 14 and E&R, “Sustainable Development w/o constraints” (IIB).
Sept 12: Sustainability continued. Weak and strong sustainability; Weitzman-World Bank sustainability, genuine savings, GNNP; opsustimality, golden rule sustainability.
Sept 19: Spatial pollution; homework assignment.
Sept 26: Dynamic w/ distribution costs (see Pitafi paper from Chris). \( P_t = a - bQ \). \( P_H = P_t + d \). \( P_L = a - bQ - d \). Add demand curves for high and low elevations, equate agg demand to total mg cost: \( c + MUC \). Show consumption for
each, $P_H$ and $P_L$. Distribution costs as water loss (Chakravorty, IV D4). Research question: generalize such that two distribution costs above (transportation costs and water loss cost) are special cases.


Oct 1: Hao presentation of Ful and Woul. Pollution under uncertainty hwk: $MB = 96 - 2G$ or $48 - 2G$, 50% probability each. $MDC = 24 + .5G$. Does pollution tax or cap & trade have lower excess burden? Which has lower excess burden if $MDC$ is uncertain instead of $MB$?

Extra Credit: $C = C(L_C); D = D(L_D,G); U = U(C,D) – DC(G) – LC(L)$. If $Rbar > 1^{st}$-best Pigouvian revenue, is $2^{nd}$-best pollution tax greater or less than $1^{st}$-best tax? Assign: Read “Incentives to Reduce Tropical Deforestation” and “Designing Institutions for Effective Forestry Management.”


Oct 8: Stern thoughts, Nori Tarui.


Nordhaus: $r = \text{eta}\times g + \text{delta}$. First-best $r$ graph => 5% (observed). $g = 2\%$, $\text{delta} = 3\%$ => $\text{eta} = 1$. Stern: $g = 1.3\%$; $\text{delta} = .1\%$; $\text{eta} = 1$. This implies social discount rate = 1.4%.

Nordhaus critique: If $\text{delta} = 1\%$, $\text{eta}$ must be 2.45, i.e., 5% = 2.45(2%) + .1%. (Implicitly assumes that sum must conform to market 5%, but Stern disagrees.) This is the old OCC vs. SDR debate in disguise. If $\text{SDR} = 1.4\%$, optimal carbon tax goes from 370 to 970 this century. If OCC used (Nordhaus), optimal carbon tax goes from 30 to 195 under option 1 and 30 to 270 under option 2. Stern fallacy: if $\text{SDR} = 1.3\%$, massive policy reforms are implied that would increase savings rate, e.g. switch to consumption tax (subtract savings from taxable income) and PAYG social security.

Oct 15: Midterm

Oct 17: Sustainability summary:
   1. Injunction to incorporate intergenerational equity and system interdependence
   2. Property of above: sustainable or not.
   3. Political movement (anti development, pro self sufficiency)

WSJ article on global delusions. Do not substitute panic for analysis. No consensus that catastrophe is immanent and that expensive action is urgently required.

New Intitutional Economics and property rights: Ostrom on Demsetz, Hardin and common property. Anderson and Hill: making Demsetz and Williamson operational. Economic history of Hawaii: Unification (benefits up, enforcement costs down); Great Mahele (property benefits up; public finance benefits up; political costs of change down).

Oct 22: Sustainability science (from climate change to ecology). Optimal mining and preservation of the forest (extraction costs, distance, planting costs, and non-convexities). Etiology of sustainability (Clintonization, Ahupaa or bust). Political economy of institutional change: North’s primary action group introduces concept, but theory offers no guidance on when to use. In contrast, NIEAO prescribes 1$^{st}$-best level of analysis for terms, 2$^{nd}$-best for organizational form, and 3$^{rd}$ best for constitutional choice, including economic policies, and race vs. inertia. (NIE rests on bounded rationality and opportunism, but these fail the test of Ockham’s Razor.) OA can result in over, under, or 1$^{st}$-best efficient harvesting. With organizational costs, OA can be 2$^{nd}$-best efficient even if it’s 1$^{st}$-best inefficient. Assign: read intra-inter (sent by Duong) and UH WP 07-3.

Oct 24: Duong on intra-inter (Endress et al.). Kaiser Hawaii paper. Assign: Chris will pick two, one for emphasis and one to describe in very general terms.
Barrett, S., Optimal Control of Soil Erosion, ch. 18 in Dasgupta & Maler, v.2.*
Barbier, “The Economics of Soil Erosion: Theory, Methodology and Examples”

Oct 29: Chris on soil conservation
Nov 5: Kaiser on Ko’olau watershed evaluation. Burnett et al. on China. Hao on Brock and Taylor
Nov 14: Attend sustainability science conference
Nov 19: Debrief sustainability science conference. Nordhaus as prototype for sustainability science. Another is watershed balance and the demand for water.
Nov 21: DICE (Nordhaus by Chris) and Chakravorty et al. (VIIIC).
Nov 26-28: Finish Chak et al., JPE ’97 paper. Offset trading, including California and Hawaii carbon caps (HB226/SB234); invasive species management (VIJ), Road Pricing. Milenium Ecosystem Assessment report; intro to trade and the environment.
Dec 3: Polasky presented by N. Tarui
Dec 5: Majah on trade and the environment. Duong on voluntary offset credits.