

**ENVIRONMENTAL ECONOMICS--EC3545-001**  
In room EDUC 220  
(for non-economics majors)

P. Graves  
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Course Content

The study of environmental economics is interesting, thought-provoking, and controversial. This is both a strength and a weakness; the strength is that the inherently interesting nature of the subject matter results in greater student interest and involvement than might be the case for many of the other fields in economics. The weakness, however, is that the emotionally-charged nature of the topic tends to lead to fuzzy thinking--indeed, there is ample evidence that this problem is not unique to the academic setting; many of the worst examples of government spending and legislation have stemmed from perceptions of a "crisis," whether it is an energy crisis, a defense or terrorist crisis, a health-care crisis, or whatever.

As you will see, the economist views environmental problems, like most other problems, as being "resource-allocation problems" (that is, are we allocating our scarce resources in such a way as to get the best combination of environmental goods and ordinary goods that we value). Another way to express this is that economists deal with **choices**. If a problem is not viewed as being a matter of choice, then it is a non-economic problem. The preceding three sentences are far more important--and controversial to many environmental studies majors!--than they might seem at this point...you might wish to read them again. To make a simple analogy, suppose you believe (for religious or other moral reasons) that it is wrong to steal--for you this is not "a matter of choice;" it is not "something to decide upon." Economists also have various beliefs, but in their role as an economist, such issues are viewed as choices, something to decide about on the basis of benefits and costs (note, these benefits and costs need *not* involve dollars!). Depending on our individual beliefs, the costs may be high relative to benefits, or they may be low. If, however, costs are higher than benefits, and we abstain from stealing, we are doing so--from the economist's perspective--as a matter of choice (informed by our moral and other beliefs). But, while the observed behavior might look similar, this is quite different from arguing that there is no choice for such decisions. A perhaps more pertinent example: some of you recycle as much as you can because you believe it is the "right" thing to do, independently of personal costs and benefits; others of you hardly recycle at all feeling that the costs are greater than the benefits. This seemingly simple point, combined with relentless brainwashing in favor of "the environment" beginning--these days--in grade school, will appear over-and-over throughout the course and makes environmental economics difficult to understand or enjoy for some students. However, I'll do what I can to make it enjoyable!

We begin with the application of basic economic and philosophical concepts to an understanding of the environment. This is followed by a relatively brief overview of environmental quality, of the major pollutants, and of how both are characterized. This is to give us a common environmental background. We then turn to an in-depth treatment of how an understanding of economics can usefully guide the analysis of environmental quality, subject to some philosophical issues already hinted at. With this as background, it is possible to turn to a consideration of appropriate environmental policy. The focus is on applications vital to a voting citizenry and to those going on to work in any area of the environment. My ultimate goal for each of you is to have you better understand (maybe even agree with!) how environmental problems are perceived by decision-makers in the "real world," hence better understand the policy approaches--good and bad--made by those decisionmakers.

Texts:

There is considerable difficulty in finding an appropriate text for this course--the reasons are many: 1) most "environmental" textbooks have too little economic content to be useful, 2) most "economic" texts have as prerequisites more economic theory than is required for this course, and 3) many books are overly mathematical for the more policy-oriented approach that I wish to pursue.

BUT, I have written a book (under contract with Rowman & Littlefield, to be published by the Spring 2007 semester) specifically for courses such as this. I am hopeful that I can get a "hardcopy" version to the bookstore, but have been asked by the publisher to eliminate the book from my website (where I had posted it). I do have some handouts that relate to the material to be discussed, though not in the detail of the book. At any rate you will find that **class attendance will be quite important, moreso than is usual at C.U.** Getting notes, if you must miss a class, is likely to be quite helpful, since the concepts in the handouts will be illustrated with numerous examples during class discussion. All notes are not created equal--if you must miss, get somebody's notes who is a good note-taker. The book I am writing is tentatively titled: Philip E. Graves *Benefit-Cost Analysis for Environmentalists: How to Play Within the 'Rules of the Game' and Win!* (Rowman & Littlefield, 2007).

#### Administrative Matters:

There will be two midterms (60%) and the final (40%). The test format is, effective with the Fall 2004 semester, multiple choice--because of ever-increasing class sizes at C.U. As a consequence, the historical sample tests on the web will be less closely related to what you will experience than is usual...this will gradually change over time as additional sample tests get administered and posted. I will calculate your course grade as the largest number arising from the following alternative calculated scores:

"Score 1":  $.3(\text{1st Mid Grade}) + .3(\text{2nd Mid Grade}) + .4(\text{Final Grade})$

"Score 2":  $.4(\text{2nd Mid Grade}) + .6(\text{Final Grade})$

"Score 3":  $.4(\text{1st Mid Grade}) + .6(\text{Final Grade})$

That is, you can mess up either midterm (or miss one--there are **no makeups** for either midterm) without harming your grade--however, the final is fully comprehensive, so you will be responsible for the information from both midterms on that exam. Moreover, I will add enough points to each exam to have the average grade be an 78 (on the border of C+/B-)...that is, if the raw mean is, say, 72, then 6 points will be added to everyone's exam--if you got a 96 raw grade, that grade becomes 102. After that adjustment, 90-100 will be A, 80-90 B, 70-80 C, 60-70 D, and below 60 F. I will let the top 5% of students, based on the first two midterms, out of the final, an incentive to really learn the material--and good for those who don't get out of the final because its average will be lower, hence more points get added. Allowing some students to get out of the final results in the midterms coming later in the semester than is usual, so that more of the material is tested upon. The **Comprehensive Final Exam is Wednesday December 20th, 10:30am-1:00pm in our classroom.** Note that if you have three exams in a day, it is the third exam that university policy allows you to reschedule, so this should not be a problem for this course this semester. The Economics Department has recently instituted some grade changes that have made it *extremely* difficult to give incompletes. The grade of IW has been completely eliminated, and the grade of IF is only given when circumstances completely beyond student control result in inability to complete the course requirements. Such cases must be brought to my attention immediately, otherwise a grade of F will be assigned.

Office: Economics 223 (Northwest corner, 2nd floor of the Economics Bldg)

Hours: TR 10:00am-11:00am and 3:30pm-4:30pm (and by appointment, if there are schedule conflicts).

Phone: (303) 492-7021 (message machine-but I am not usually in the office on a daily basis). Better:

**e-mail: gravesp@spot.colorado.edu (e-mail definitely preferred route of communication--I'm online daily usually 24/7 and at odd hours).**

**Note: 1) Students with disabilities who qualify for academic accommodations must provide a letter from Disability Services (DS) and discuss specific needs with me, preferably during the first two weeks of class. DS determines accommodations based on documented disabilities (303-492-8671, Willard 322, [www.colorado.edu/sacs/disabilityservices](http://www.colorado.edu/sacs/disabilityservices)). Campus policies (including those involving the new student honor code, plagiarism, classroom behavior policies, and the like) can be viewed at: <http://www.colorado.edu/policies/index.html>. Direct any questions you have about these policies to me.**

**2) Campus policy regarding religious observances requires that faculty make every effort to reasonably**

and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, it is unlikely that this will be a problem, since I do not take attendance in any event. Should we be voting for a test date that conflicts with religious observances, point this out to me and that date will be eliminated from consideration. See full details at [http://www.colorado.edu/policies/fac\\_relig.html](http://www.colorado.edu/policies/fac_relig.html)

3) Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at:

<http://www.colorado.edu/policies/classbehavior.html> and at [http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student\\_code](http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code)

4) All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council ([honor@colorado.edu](mailto:honor@colorado.edu); 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>

Approximate Course Outline (subject to change as the course progresses, pending book progress):

### Week Topic

1,2 Overview and Introduction (The Market and When It Fails to Give Us What We Want):

Introduction: "Doomsters" vs. "Boomsters" and their views of natural resource and environmental trends; Logical matters of rationality; ordinary goods and environmental goods; Supply and Demand. Efficiency versus equity (yachts and E.Q.);  $MSB=D?$   $MSC=S?$ ; Use of \$'s; "Values" (what the market does and broader issues of whether human marginal willingness-to-pay is "appropriate" even without external costs or benefits); externalities; public goods (new--quite pro-environment--material here, not yet in any book!); the role of property rights and enforcement (endangered species, but also air, etc). The "missing market." It is in this philosophical section of the course that the issues raised by Ackerman and Heinzerling first appear, but they continue in later discussion of valuation...of what it is that economists are trying to discover.

3 An Environmental Background (Local Environmental Problems):

I will only briefly discuss the "state of the world." I am assuming that you have been very much exposed to the Doomster position (brainwashed?), so will have you read Lomborg here and as the course proceeds. While I will not be testing in excruciating detail on the information in Lomborg's book (partly because he has a very selective take on the extant literature), I will want you to have a solid general sense of his arguments (you do not need to believe them--I am most definitely *not* trying to brainwash you!)

4 Overview of an Interdisciplinary Approach to Environmental Analysis (5-Box Diagram)

Costs of policy and impact on emissions; dispersion; benefits of policy (damage reduction); spatial adaptations in policy; incidence of policy (who is helped and hurt?).

5,6 The Economic Theory of Environmental Quality

The consumer optimum (excess pollution in the uncontrolled case, due to externalities); the firm optimum (excess pollution in the uncontrolled case, due to externalities); the law of conservation of matter and energy and

the summation of (non-optimally large) individual emissions into the environmental quality we all consume; "social welfare functions" and implications in the environmental setting.

#### 7 Interdisciplinary Approach (Boxes 1 & 2)

Policy costs (add-on devices, input substitutions, spatial and temporal modifications, and input/output bans; higher costs or reduced quantities of other goods ultimately--TANSTAAFL, but some "no regrets" policies) and the impact on discharges; going from discharges to environmental quality.

#### 8 Interdisciplinary Approach (Box 3)

Three approaches to benefit estimation: 1) referenda, 2) survey/experimental, and 3) use of known relations between environmental and other goods. Sub-approaches of the last: 3a) sum of specific damages, 3b) hedonic approaches, 3c) travel cost; philosophical issues again--the "statistical value of life" (review "values" and preferences over values--read Ackerman and Heinzerling discussion of this).

#### 9 Interdisciplinary Approach (Boxes 4 & 5)

The spatial dimension in environmental policy; local, regional and global damages. What are the equity implications of environmental policy as practiced in the U.S.? Why the poor pay a higher percentage of income in environmental cost and why the poor receive lower environmental benefits as a percentage of income (i.e. env policy is regressive).

### **Midterm #1 will cover the preceding material.**

#### 10,11 Benefit-Cost Analysis (certainty and uncertainty)

government failure; Ben Franklin quote; consumer and producer surplus; four approaches to project evaluation (and why "net present value" is to be preferred); B&C as S&D in disguise. Multi-attribute analysis. The rationality of discounting and the appropriate choice of discount rate (again some new material here, not yet in books).

#### 12 The Coase Theorem

Why there are not more environmental problems than there are--the Coase theorem; applications to the steel plant/laundry, to the reserve clause of baseball, and to water allocation.

#### 13 International Trade and Environmental and Human Rights Concerns

Benefits from trade, in terms of wealth gains, for all countries (production possibility curve and S&D approaches). Relationships between wealth and demand for environmental quality and labor standards. History of U.S. Temporary problems. Potential for more of everything, including environmental quality. Controversial trade material that is very poorly understood by non-economists (and even some economists!).

#### 14 An Ecological Doomsday Model (optional...we usually do not get to this material)

An ecosystem: rabbits and foxes (simultaneous equations); An ecological background; The biologist/environmentalist versus the economist: notions of assimilative capacity, environmental damages may be "optimal" (i.e. externalities can be internalized, but with remaining environmental damage), and the "downward spiral" of ever-worsening condition of **both** the economic and environmental systems! Relevance of the model and possible offsets.

#### 15 Policy Analysis--What Does Economic Theory Suggest?

Criteria for evaluation of policy; Coase and moral suasion (decentralized approaches); Command-and-control strategies (standards, required equipment); Incentive-based approaches (taxes, subsidies, salable emission rights).

### **Midterm 2 will cover the material between that of Midterm 1 and here.**

#### 16 Actual U.S. Policy

Water pollution control policies; Air pollution control policies; Toxic and Hazardous substance policy; miscellaneous related issues. I find the historical policy material somewhat boring, so it is not emphasized.

17 Miscellaneous Topics

International environmental responsibility (foreign, alternative economic system, global); baby certificates and pollution permits; thinking about the carrying capacity of a wilderness area; fisheries economics and rain forest issues

18 Epilog--Do You Expect The Future To Be "Better"?

Alternative views of the future. Population and income growth--are they good or bad? The "boomsters" versus the "doomsters"--and the Simon/Ehrlich bet; intergenerational equity; summary and review

**(Comprehensive Final Exam, Wednesday December 20, 10:30am-1:00pm in our classroom--Good Luck!)**