



**Instructor Information:**

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479-575-2323  
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**Description of this course:**

Markets reflect the benefits and cost of economic activities to those who participate in buying and selling goods and services. This course explores the third-party effects that result when market transactions that change the environment or natural resources affect someone other than those involved in the market transaction. The course covers a range of contemporary environmental and natural resource policies such as tradable carbon credits, renewable energy incentives, conservation easements, and endangered species protection. *Course Prerequisites: 3000 level economics or agricultural economics; or Ph.D. standing.*

**Course Objectives:**

Each student who successfully completes this course will:

- understand the economics of environmental quality and analytical tools of environmental analysis;
- demonstrate knowledge of the criteria for evaluating environmental policies;
- apply economic principles to real-world environmental and resource issues;
- demonstrate knowledge of the current and past environmental and resource policy;
- develop economic intuition for dynamic problems

**Office Hours:**

Regular office hours held in AGRI 216 are scheduled for Tuesdays and Thursdays from: 3:00-4:00pm, or you can email to schedule an appointment. Please contact me if you make an appointment and then are no longer able to make it to the appointment. I have an open door policy and welcome any questions that you may have. I am in my office most of the time and encourage you to stop by and ask questions.

**Course Home Page on Blackboard 9.1:**

Material for this course, including syllabus, homework, reading materials, and test reviews can be found on Blackboard 9.1. You can reach Blackboard 9.1 at <http://learn.uark.edu>. Login with your uark email username (do not use the "@uark.edu") and password. Once enrolled in AGECE 5133, the course will appear in your My Courses listing. Once in the course, click on the item of interest like "Homework" and then the menu under that item will come up and you click on the item of interest.

**Grading:**

Homework	20%	Final Exam	15%
Quizzes	10%	Issue Brief	15%
Midterm	15%	Presentation of Issue Brief	15%
Reading Exercises	10%	<b>Total</b>	<b>100%</b>

Grades will be assigned as follows:

A: > 89%	D: 69 - 59 %
B: 89 - 79 %	F: < 59 %
C: 79 - 69 %	

**Quizzes:**

Quizzes take place in-class, and if there is a quiz that week, an announcement will be made. Quiz questions are multiple-choice and based on text and class material. Make up quizzes *may* be permitted and *must* be arranged prior to the exam unless it is a medical emergency (personal or close family).

**Reading Exercises:**

A set of reading exercises are based on required readings announced at an earlier class. The objective of these exercises is to reinforce what we have learned in class. You work on these exercises individually. Remember to write down your name on the answer sheet.

Each reading exercise is worth 10 points. Your total points of all reading exercise will then be converted to 10% of your class grade. Make up exercises *may* be permitted and *must* be arranged prior to the exercise unless it is a medical emergency (personal or close family).

**Midterm:**

Midterm is *both* in-class and take-home. The take home component involves a question that takes more time to solve than the allotted class time. *All take home components must be handed in at the beginning of class (by 2:00p.m.) on the date due. Copying from one take home exam to another will result in zeros on all involved exams. Late assignments will be penalized as follows: Date due: -10 points after 2:00p.m. No assignment will be accepted after 4:30 p.m. on the due date for any reason.* No hats may be worn during in-class exams. Make up exams *may* be permitted and *must* be arranged prior to the exam unless it is a medical emergency (personal or close family).

**Homework:**

All homework must be downloaded from Blackboard 9.1. While homework may be worked on in groups, each student must turn in his/her own copy written in his/her own words. Blatant copying from one homework to another will result in zeros on all involved papers. Students are encouraged to type all homework. *Hard copy must be turned in. Electronic submission is not acceptable except in extenuating circumstances. All homework must be handed in at the beginning of class (by 2:00p.m.) on the date due. Students will drop one (1) homework grade in computing their homework grade component.*

*Late homework and take home exams can be handed in the day it is due with penalty. Late assignments will be penalized as follows: Date due: -10 points after 2:00 p.m. No assignment will be accepted after 4:30 p.m. on the due date for any reason. Assignments may be submitted early.*

**Issue Brief:**

The issue brief requires each student to analyze a contemporary environmental and natural resource issue in a 5-7 page single-spaced paper. Each student is responsible for researching all relevant aspects of the issue in question. The student will then be responsible for applying an economic critique of the issue using the tools and concepts discussed in class. *The issue brief grade is composed of a brief proposal summarizing the policy you will analyze (20%) and a final written report (80%). The proposal is due by April 1<sup>st</sup> at the beginning of class (by 2:00p.m.) and the final written report is due by May 1<sup>st</sup> (by 4:30p.m.).* The student is encouraged to choose an issue of importance to Arkansas, but this is not required. *Late assignments will be penalized as follows: Date due: -10 points after 2:00 p.m. for proposals. No proposal or final written report will be accepted after 4:30 p.m. on the due date for any reason.*

Example issue briefs include-but are not limited to-the following:

- Pollution policies
  - Total maximum daily loads
  - Tradable pollution permits
- Water conservation
  - Water rights trading
  - Arkansas groundwater pricing
  - Riparian doctrine
- Energy conservation
  - Renewable-electricity standards

- Land conservation
  - Arkansas smart-growth and urban sprawl
  - Ecosystem management
  - Land trust conservation
- Forest resources
  - Forest certification
  - Carbon sequestration policies

Example issue briefs can be found on the websites of the Economic Research Service ([www.ers.usda.gov](http://www.ers.usda.gov)), a government agency that informs decision making on economic and policy issues related to agriculture, and Resource for the Future ([www.rff.org](http://www.rff.org)), a think tank specializing in the economics of environmental and natural resource management. This is the web page holding all publications by the Economic Research Service: <http://www.ers.usda.gov/publications.aspx>. This is the web page holding all issue briefs by RFF: <http://www.rff.org/Publications/Pages/PublicationsList.aspx?PublicationType=Issue%20Briefs>. Please note that plagiarism will not be tolerated.

### **Presentation of Issue Brief:**

Each student is required to make a 15 minute presentation using powerpoint on the contemporary environmental and natural resource policy issue chosen for their issue brief. The grading of the presentation is based on the content and the success of the student at engaging the audience. The content of presentation is judged based on the thoughtfulness of the analysis of the policy. Success at engaging the audience is based on whether the powerpoint added to the presentation and the ability of the student to respond to questions. The grade on this assignment is also influenced by level of participation shown to the other presentations.

### **Textbooks:**

Most readings are taken from:

Environmental Economics, by Charles D. Kolstad. 2<sup>nd</sup> Edition. 2011. Oxford University Press. (ISBN: 978-0199732647)

Resource Economics, by Jon Conrad. 2<sup>nd</sup> Edition. 1999. Cambridge University Press. (ISBN 978-0521697675)

Environmental Economics: An Introduction, by Barry C. Field and Martha K. Field. 5<sup>th</sup> Edition. 2009. McGraw-Hill Irwin. (ISBN 978-0073375762)

Markets and the Environment, by N.O. Keohane and S.M. Olmstead. 2007. Island Press. (ISBN 978-1597260473)

**Students are not required to purchase these books.** One copy will be placed on reserve in Mullins library. It can be loaned out for two hours at a time. These books are also available for purchase in the bookstore. Student must leave a valid ID card with the departmental secretary in order to check out materials from AEAB. Materials may be checked out for 2 hours. Failure to return materials in a timely manner can result in the loss of check out privileges as determined by departmental personnel.

The following books provide additional background reading:

Environmental Economics in Theory and Practice, by Nick Hanley, Jason Shogren, and Ben White. 2<sup>nd</sup> Edition. 2007. Palgrave MacMillan. (ISBN 978-0333971376):

Excellent survey of the breadth of topics in environmental and resource economics.

Agricultural and Environmental Resource Economics, by G.D. Carlson, D. Zilberman, and J. Miranowski. 1993. Oxford University Press. (ISBN 978-0195076516):

An environmental and resource text with case studies in agriculture.

Environmental Economics and Management: Theory, Policy and Applications, by Scott J. Callan and Janet M. Thomas. 5<sup>th</sup> Edition. 2010. South-Western Cengage Learning. (ISBN: 978-1-4390-8063-4)

An introductory environmental and resource economics book to brush up on economic modeling.

**Electronic Devices:**

Please turn off all electronic devices that ring, buzz or hum before class commences.

**Class Attendance and Punctuality:**

You are strongly encouraged to weigh the opportunity costs of missing class since lectures greatly aid in understanding course material. Some test questions may come directly from material presented only in class (not in your textbook). Class participation will be considered in cases of a borderline grade.

Tardiness is not acceptable. Leaving the class must be arranged prior to the class unless it is a medical emergency (personal or close family). An unarranged departure without the instructor's permission is also not acceptable.

**Students With Disabilities:**

If you want to request reasonable accommodations for this class due to a disability, you must first register with the Center for Students with Disabilities (CSD) and hand-deliver an official Accommodation Letter from the CSD to me during my office hours or after class. For more information contact the CSD at:

Center for Students with Disabilities  
University of Arkansas  
104 ARKU Fayetteville, AR 72701,  
479-575-3104 (Voice) or 479-575-3646 (TTY)

**UA Academic Dishonesty Policy:**

"As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail." "Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy' which may be found at <http://provost.uark.edu/> Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor."

**Severe Weather:**

If the University is open, we will have class. Please use your best judgment before getting on the road. *Students who live off-campus will have the opportunity to make up a missed exam. However, in order to receive full credit, homework must be emailed to the instructor by 10:30 A.M. the day it is due.*

**Emergency Procedures:**

Many types of emergencies can occur on campus; instructions for specific emergencies such as severe weather, active shooter, or fire can be found at [emergency.uark.edu](http://emergency.uark.edu).

**Severe Weather (Tornado Warning):**

- Follow the directions of the instructor or emergency personnel
- Seek shelter in the basement or interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building
- Stay in the center of the room, away from exterior walls, windows, and doors

**Violence / Active Shooter (CADD):**

- *CALL*- 9-1-1
- *AVOID*- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- *DENY*- Barricade the door with desk, chairs, bookcases or any items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it's safe.
- *DEFEND*- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

## Useful Information Available on the Web

### STATE, FEDERAL, AND INTERNATIONAL ENVIRONMENTAL RESOURCES

Air Pollution Monitoring	<a href="http://www.epa.gov/oar/oaqps/montring.html">http://www.epa.gov/oar/oaqps/montring.html</a>
Animal Plant Health Inspection Service	<a href="http://www.aphis.usda.gov/">www.aphis.usda.gov/</a>
Bureau of Land Management	<a href="http://www.blm.gov/nhp/index.htm">http://www.blm.gov/nhp/index.htm</a>
Canadian National Pollutant Release Inventory	<a href="http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm">http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm</a>
Department of Environmental Quality, Arkansas	<a href="http://www.adeq.state.ar.us/">http://www.adeq.state.ar.us/</a>
Economic Research Service	<a href="http://www.ers.usda.gov/">http://www.ers.usda.gov/</a>
Energy Office, Arkansas	<a href="http://www.arkansasenergy.org/">http://www.arkansasenergy.org/</a>
Environmental Protection Agency, Arkansas	<a href="http://www.epa.gov/aboutepa/states/ar.html">http://www.epa.gov/aboutepa/states/ar.html</a>
Environmental Protection Agency, Economics	<a href="http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/homepage">http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/homepage</a>
Food Safety and Inspection Service	<a href="http://www.fsis.usda.gov/">www.fsis.usda.gov/</a>
Forestry Commission, Arkansas	<a href="http://forestry.arkansas.gov/">http://forestry.arkansas.gov/</a>
Game and Fish Commission, Arkansas	<a href="http://www.agfc.com/">http://www.agfc.com/</a>
International Environmental Management	<a href="http://www.ehso.com/EHSO_Intl.htm">http://www.ehso.com/EHSO_Intl.htm</a>
Natural Resources Commission, Arkansas	<a href="http://www.anrc.arkansas.gov/">http://www.anrc.arkansas.gov/</a>
United Nations Environmental Program	<a href="http://www.unep.org">http://www.unep.org</a>
USDA Forest Service, Southern Research Station	<a href="http://www.srs.fs.usda.gov/">http://www.srs.fs.usda.gov/</a>
US Department of Energy	<a href="http://apps1.eere.energy.gov/">http://apps1.eere.energy.gov/</a>
US Fish and Wildlife Service, Arkansas	<a href="http://www.fws.gov/arkansas-es/">http://www.fws.gov/arkansas-es/</a>
US Geologic Survey, Arkansas	<a href="http://ar.water.usgs.gov/PROJECTS/WUData.html">http://ar.water.usgs.gov/PROJECTS/WUData.html</a>
World Bank Industrial Pollution Regulation	<a href="http://www.worldbank.org/nipr/">http://www.worldbank.org/nipr/</a>
WTO; Trade & Env.	<a href="http://www.wto.org/english/tratop_e/envir_e/envir_e.htm">http://www.wto.org/english/tratop_e/envir_e/envir_e.htm</a>

### OTHER ENVIRONMENTAL RESOURCES

Arkansas Environmental Federation	<a href="http://www.environmentark.org/">www.environmentark.org/</a>
Ecological Society of America	<a href="http://www.esa.org">www.esa.org</a>
Environmental Economics Blog	<a href="http://www.env-econ.net/">http://www.env-econ.net/</a>
Environmental Working Group (note CLEAR page)	<a href="http://www.ewg.org/">www.ewg.org/</a>
Sierra Club	<a href="http://www.sierraclub.org">www.sierraclub.org</a>
Water Environment Federation	<a href="http://www.wef.org/Home.htm">http://www.wef.org/Home.htm</a>
National Library for the Environment	<a href="http://www.cnle.org/nle/">www.cnle.org/nle/</a>
Natural Resources Research Information Pages	<a href="http://www4.ncsu.edu/~leung/nrrips.html">http://www4.ncsu.edu/~leung/nrrips.html</a>
Nature Conservancy	<a href="http://www.nature.org/">www.nature.org/</a>
Northwest Arkansas Land Trust	<a href="http://www.nwalandtrust.org/">http://www.nwalandtrust.org/</a>
Resources for the Future	<a href="http://www.rff.org">www.rff.org</a>
Soil and Water Conservation Society	<a href="http://www.swcs.org">www.swcs.org</a>
The Trust for Public Land	<a href="http://www.tpl.org">www.tpl.org</a>

### ECONOMIC DATA AND STATISTICS

U.S. Census Bureau: Census 2000	<a href="http://www.census.gov/main/www/cen2000.html">http://www.census.gov/main/www/cen2000.html</a>
National Council for Science and the Environment	<a href="http://www.cnle.org/NLE/CRS/">http://www.cnle.org/NLE/CRS/</a>
National Agricultural Statistic Service	<a href="http://www.usda.gov/nass/">www.usda.gov/nass/</a>
Central Intelligence Agency World Factbook	<a href="http://www.cia.gov/cia/publications/factbook/index.html">http://www.cia.gov/cia/publications/factbook/index.html</a>
Economic Census (2002)	<a href="http://www.census.gov/econ/census02/">http://www.census.gov/econ/census02/</a>
National Bureau of Economic Research	<a href="http://www.nber.org/">www.nber.org/</a>
US Census Bureau	<a href="http://www.census.gov">www.census.gov</a>
USDA Agricultural Fact Book	<a href="http://www.usda.gov/nass/pubs/agstats.htm">http://www.usda.gov/nass/pubs/agstats.htm</a>
American Agriculture Economics Association	<a href="http://www.aaea.org">http://www.aaea.org</a>
International Association of Agricultural Economists	<a href="http://www.iaae-agecon.org/">http://www.iaae-agecon.org/</a>

### REGULATIONS

Environmental laws	<a href="http://www.nationalaglawcenter.org/readingrooms/">http://www.nationalaglawcenter.org/readingrooms/</a>
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Environmental Issues in Farm Bill Information  
CERCLA information  
EPCRA information  
US EPA laws that affect agriculture  
League of Conservation Voters  
Natural Resource Defense Council

<http://www.nrcs.gov/programs/farmbill/2002/>  
<http://www.epa.gov/superfund/policy/cercla.htm>  
<http://www.epa.gov/Compliance/civil/epcra/index.html>  
<http://www.epa.gov/agriculture/law.html>  
[www.lcv.org](http://www.lcv.org)  
<http://www.nrdc.org>

## **OTHER**

Agriculture Online Magazine  
The Environment Directory  
America Journalism Review  
Arkansas papers  
ERS (Economic Research Services) Publications  
The Agriculture Network Information Center  
Institute for Agriculture and Trade Policy  
Links for economics data  
Links to resources for economists on the web  
National Research Initiative Competitive Grants Program  
Univ of Ark page offering links for economists  
Environmental Resources Management

<http://www.agriculture.com/>  
[www.webdirectory.com/](http://www.webdirectory.com/)  
<http://ajr.org/>  
<http://www.ajr.org/Newspapers.asp?MediaType=1&Type=StateNews&State=5>  
<http://www.ers.usda.gov/publications/>  
[http://www.agnic.org/agnic/index\\_html](http://www.agnic.org/agnic/index_html)  
<http://www.iatp.org/>  
<http://www.helsinki.fi/WebEc/webecc8d.html>  
<http://rfe.org>  
<http://www.csrees.usda.gov/funding/nri/nri.html>  
[www.uark.edu/depts/agriecon/](http://www.uark.edu/depts/agriecon/)  
[www.erm.com](http://www.erm.com)

**Course Outline, Reading Assignments, Homework and Exams** (*Dates/materials are subject to change*)

Week	Week of	Topic	Reading Material	Homework
1	Jan 13	Course intro; overview of environmental economics	K, Ch 1,2,4; FF, Ch 1,2; KO, Ch 1,2,4	
2	Jan 20	Regulating pollution	K, Ch 11-14; FF, Ch 11-13; KO, Ch 8-10	
	Jan 25	<i>LAST DAY TO DROP THE COURSE WITHOUT A MARK OF A W</i>		
3	Jan 25	Regulating pollution (continued)	K, Ch 11-14; FF, Ch 11-13; KO, Ch 8-10	
4	Feb 3	Property rights	K, Ch 11-14; FF, Ch 10; KO, Ch 8-10	I
5	Feb 10	Property rights (continued)	K, Ch 11-14; FF, Ch 10; KO, Ch 8-10	
6	Feb 17	Regulating pollution in imperfect markets	K, Ch 15-16; KO, Ch 8	
7	Feb 24	Regulating pollution in imperfect markets (continued)	K, Ch 13, 19; KO, Ch 8, 10	II
8	Mar 2	Provision of public goods	K, Ch 5,6; FF, Ch 6-8; KO, Ch 5	
9	Mar 9	Benefit-cost analysis; non-market valuation	C, Ch 1.0-1.3; K, Ch 3	III
10	Mar 16	Review		
	<b>Mar 18</b>	<b>Midterm</b>	Weeks 1 though 9	
11	Mar 23	<i>SPRING BREAK (No classes)</i>		
12	Mar 30	Discounting; simple 2-period dynamic optimization	C, Ch. 1.4-1.7; KO, Ch 6	
	<b>Apr 1</b>	<b>Issue brief proposal due</b>		
13	Apr 6	Non-renewables - Hotelling's Rule	C, Ch. 5.0-5.5; KO, Ch 6	
14	Apr 13	Open access; <b>class presentation of projects</b>	C, Ch, 2.0-2.3, 3.0-3.7; KO, Ch 7	IV
15	Apr 20	Basic bioeconomics; <b>class presentation of projects</b>		
16	Apr 27	Review; <b>class presentation of projects</b>	C, Ch, 2.0-2.3, 3.0-3.7; KO, Ch 7	V
	<b>May 1</b>	<b>Issue brief due at 4:30p.m.</b>		
	May 1	Dead Day		
	May 4	<b>Final Exam 3:00pm-5:00pm in HOEC 0106</b>		

Readings Guide

K – Kolstad  
 C - Conrad  
 KO - Keohane & Olmstead  
 FF – Field & Field

## AGEC 5133 - Outside Reading List

### **Pollution policies:**

- [1] Schmalensee R. and R. Stavins. 2012. "The SO<sub>2</sub> Allowance Trading System: The Ironic History of a Grand Policy Experiment." *Resources for the Future Discussion Paper 12-44*.
- [2] Burtraw, D., D.W. McLaughlin, S. Szambelan. 2012. "California's New Gold: A Primer on the Use of Allowance Value Created under the CO<sub>2</sub> Cap-and-Trade Program." *Resources for the Future Discussion Paper 12-23*.
- [3] Cropper, M.L., W.S. Isaac. 2011. "The Benefits of Achieving the Chesapeake Bay TMDLs (Total Maximum Daily Loads): A Scoping Study." *Resources for the Future Discussion Paper 11-31*.

### **Forest resources:**

- [4] Sedjo, R.A., and D. Botkin. 1997. "Using Forest Plantations to Save Natural Forests." *Environment*, 39(10): 14-30.
- [5] Rametsteiner, E., and M. Simula. 2003. "Forest Certification—an Instrument to Promote Sustainable Forest Management?" *Journal of Environmental Management*, 67: 87-98.
- [6] Sedjo, R.A., and M. Amano. 2006. "The Role of Forest Sinks in a Post-Kyoto World." *Resources*, 162: 19-22.
- [7] Vincent, J.R., and C.S. Binkley. 1993. "Efficient Multiple-Use Forestry May Require Land- Use Specialization." *Land Economics*, 69(4): 370-376.

### **Land Resources:**

- [8] McConnell, V., Walls, M., and E. Kopits. 2006. "Explaining Sprawl: How Much Does Zoning Matter?" *Resources*, 161: 16-19.
- [9] Stein, B.A. 2001. "A Fragile Cornucopia: Assessing the Status of U.S. Biodiversity." *Environment*, 43(7): 10-22.
- [10] Armsworth, P.R., Dailey, G.C., Kareiva, P., and J.N. Sanchirico. 2006. "Land Market Feedbacks can Undermine Biodiversity Conservation." *Proceedings of the National Academy of Sciences*, 103(14): 5403-5408.
- [11] Armsworth, P.R., and J.E. Roughgarden. 2003. "The Economic Value of Ecological Stability." *Proceedings of the National Academy of Sciences*, 100(12): 7147-7151.
- [12] Nelson, E., Polasky, S., Lewis, D.J., Plantinga, A.J., Lonsdorf, E., White, D., Bael, D., and J. Lawler. 2008. "Efficiency of Incentives to Jointly Increase Carbon Sequestration and Species Conservation on a Landscape." *Proceedings of the National Academy of Sciences*, 105(28): 9471-9476.
- [13] Jack, B.K., Kousky, C., and K.R.E. Sims. 2008. "Designing Payments for Ecosystem Services: Lessons from Previous Experience with Incentive-Based Mechanisms." *Proceedings of the National Academy of Sciences*, 105(28): 9465-9470.

### **Energy Resources:**

[14] Newell, R.G. 2006. "What's the big deal about oil? How we can get oil policy right." *Resources*, 163:6-10.

[15] Kopp, R.J. 2006. "Replacing Oil: Alternative Fuels and Technologies." *Resources*, 163:15-18.

[16] Runge, C.F., and B. Senauer. 2007. "How Biofuels Could Starve the Poor." *Foreign Affairs*, May/June: 41-53.

[17] Fargione, J., Hill, J., Tillman, D., Polasky, S., and P. Hawthorne. 2008. "Land Clearing and the Biofuel Carbon Debt." *Science*, 319(29): 1235-1238.

[18] Krautkraemer, J.A. 2005. "The Economics of Natural Resource Scarcity: The State of the Debate." *Resources for the Future* Discussion Paper 05-14.

### **Water Resources:**

[19] E. Mansur, S. Olmstead. 2012. "The value of scarce water: Measuring the inefficiency of municipal regulations." *Journal of Urban Economics* 71:332-346.

[20] N. Brozović, D.L. Sunding, and D. Zilberman. 2010. "On the spatial nature of the groundwater pumping externality." *Resource and Energy Economics* 32: 154-164.

[21] Newburn, D., N. Brozovic, and M. Mezzatesta. 2011. "Agricultural water security and instream flows for endangered species." *American Journal of Agricultural Economics* 93(4): 1212-1228.

### **Stock Pollutants and Climate Change:**

[22] Falk, I., and R. Mendelsohn. 1993. "The Economics of Controlling Stock Pollutants: An Efficient Strategy for Greenhouse Gases." *Journal of Environmental Economics and Management*, 25: 76-88.

### **Sustainability:**

[23] Brander, J.A., and M.S. Taylor. 1998. "The Simple Economics of Easter Island: A Ricardo-Malthus Model of Renewable Resource Use." *American Economic Review*, 88(1): 119-138.

[24] Foley, J.A. et al. 2005. "Global Consequences of Land Use." *Science*, 309 (July 22): 570-574.

[25] Worm, B. et al. 2006. "Impacts of Biodiversity Loss on Ocean Ecosystem Services." *Science*, 314 (Nov. 3): 787-790.