

**Agricultural and Applied Economics 4344**  
**Sustainable Development Economics**  
Fall 2008  
CRN 90072

***Instructor***

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***I. Course Overview***

This course describes and analyzes different views about the relationship between environmental quality and economic development in the US and in developed and developing countries. Topics include definitions of development and sustainability, economic perspectives of sustainable development, the relationship between development and the environment, and policies designed to promote sustainable development. Case studies of sustainable development issues are explored in depth.

***II. Goal***

The goal of this course is to integrate development and natural resource management concepts in order to understand sustainable development debates and how policies for sustainable development can be formulated, implemented, and evaluated.

***III. Objectives***

The objectives of the course are to further develop your abilities to

- (1) Analyze competing arguments and concepts related to sustainable development using qualitative and quantitative reasoning;
- (2) Synthesize your positions on contemporary issues such as global food security, protection of renewable resources, and wise use of nonrenewable resources;
- (3) Communicate your views effectively in writing and speaking.

#### ***IV. Course Website***

A website for the course is located on the Virginia Tech Blackboard. Go to the portal: <http://www.learn.vt.edu/> and login with your VT pid and password. Then click on the name of this class “Sustainable Development Economics” under "My Courses" on the right side of the screen. A course syllabus, questions on the readings, and other documents are posted there.

#### ***V. Course Organization and Expectations for Students***

The course will be taught as a true seminar, and, as such, maximum student participation is expected. Everyone is expected to have read the assigned reading before class. If you have not completed the readings before class, you will have very little to contribute to the class discussion and it makes no sense to attend.

Any student with special needs or circumstances should feel free to discuss these with me.

#### ***VI. Reading material***

Readings posted on Blackboard.

#### ***VII. Field trip***

The class will take a field trip to the Powell River Project Research and Education Center located near Norton, Virginia. The purpose of the tour is to evaluate the sustainability of surface coal mine land reclamation. We will view sites in the Norton/Wise area that have been developed for business/retail/housing and then go to the Powell River Project Research & Education Center to look at renewable resource post-mining land use options as well as environmental issues. We will leave by van at 8:00 a.m. and return by approximately 7:00 p.m. Students should bring a lunch or have money to purchase a fast-food lunch in Norton. Students taking the field trip will receive extra credit for one quiz and one class period attendance. Students who are unable to attend the field trip but wish to receive credit for class attendance that day should see the instructor for an optional makeup assignment. There may be a fee to cover the cost of the van rental.

#### ***VIII. Grades***

Grades are based on:

- 1) Essays on reading assignments (40 percent)
- 2) Participation & contribution to class discussion (20 percent)
- 3) Class debate (oral presentation and written essay) (20 percent)
- 4) Empirical analysis paper (10 percent)
- 5) Quizzes (10 percent) (6 and drop lowest 2)

## **Reading Assignment Essays (40% of final grade)**

What you take out of this course is based almost entirely on whether you do the readings. We will discuss all the materials assigned on the reading list. No one will “tell” you what are the most important elements and themes in the articles. This will come from your understanding of the readings and our class discussions. The class will discuss the implications, limitations, strengths, etc. of the readings so it is critical that you come to class having read the articles.

### *Written essays on the readings*

Writing is the best discipline you can impose on your thinking. Consequently, you will be asked to prepare a minimum of 6 short essays during the semester. Do not feel, however, limited to just 6 essays. You can write as many as you want. Your 6 best will be used to determine your essay grade. You may also write an essay on debate topics presented by others.

To be accepted, essays must meet the following requirements:

- 1) essays must be a minimum of 2 double spaced, typed pages (1” margins, 12 point Times font)
- 2) essays must be turned in at the *beginning* of class (prior to the readings actually being discussed in class). One essay per class period may be submitted. Late submissions will receive a 25 percent grade penalty.

The essays are your response to the assigned readings. For each day’s readings there will be two or more questions provided on the class website that will help guide you in structuring your essay. Please indicate which question you are addressing in your essay. Or if you prefer, write your own question and answer it. There may be no right or wrong answer to the question(s) but there are good and bad answers in terms of how well supported your reasoning is. Your response and reaction to the readings and the posed questions can take a variety of forms. You may wish to synthesize or compare the current set of readings with ideas in other sections, critique the logic or conclusions of the articles, extend the logic/arguments based on your previous training, raise new arguments that you felt were overlooked, identify and challenge assumptions or premises of the analysis, or identify empirical support or weaknesses of conceptual models. These are only suggestive. The idea is for you to use the opportunity to think expansively, explore ideas, analyze, ponder, question, etc, these very complex issues and improve your skill of inquiry.

### *Evaluation of your essays*

The essays will be graded on your understanding of and reaction to the issues contained in the readings. You will be evaluated on how well you provide insights and analytical, logically reasoned support for your views, not whether you take the ‘right’ or ‘wrong’ position on the issue. So do not be afraid to express yourself. The following steps will help you in developing effective essays.

1. Focus—make clear the objective of your essay. Identify the assigned question that you will answer. Of if you prefer, make up your own question and pose it in the introduction.
2. Organize—divide your essay into paragraphs. Use each paragraph to advance one important idea in your essay and build toward the conclusion.
3. Summarize—restate the major ideas from the reading(s) that address the question you are answering.
4. Analyze—tell where you agree and disagree with the assigned reading regarding the question. Use reasoning, examples, other readings, concepts from other classes, or your own experiences to help make your points.
5. Conclude—close with a short concluding paragraph which restates the major points of your essay.

Students are responsible for keeping track of how many essays they have turned in. Students should keep a copy of returned work until after course grades are posted.

### **Participation (20% of final grade)**

Your participation grade is based on your contributions to the class discussion. Your contribution is based on attendance and expressing your opinions. Attendance will be taken at each class period. Students receive no credit for participation on days that they are absent unless they are excused. ***Excused absences will only be given if a written and signed excuse is provided.*** The two lowest daily participation grades will be dropped in computing your final grade.

During some class sessions, the class will be divided into small groups to discuss and report back to the class their responses to assigned questions. Participation in these groups including serving as group reporters is an important part of class participation. Everyone should participate as a group reporter at least once during the semester.

### **Quizzes (10% of final grade)**

Six unannounced quizzes will be given during the semester. Each quiz will cover the assigned readings for the day on which it is given. Questions will be broad and intended to check your understandings of the main themes of the assigned readings rather than details. Your two lowest quiz grades will be dropped in calculating the final grade. There will be no makeup quizzes given under any circumstances.

## Class Debates (20% of final grade)

The purpose of debates is to give students an opportunity to explore, analyze, and discuss divergent topics in sustainable development. Each debate will be led by two teams made up of 2 to 3 students per team. Debates will include an opening presentation by each team with follow-up questions and discussion and a written report. The following is a **partial** list of potential topics. Teams may also select a topic not on the list. A topic cannot be selected by more than one team. Topics must be approved by me.

### *Potential topics*

1. Water quality standards in the Chesapeake Bay
2. Economic development in Southside Virginia
3. Future development in Appalachian coal mining areas (eg. mountain top removal)
4. Preserving the Amazonian rainforest
5. Are concentrated animal feeding operations (CAFOs) sustainable?
6. Does Virginia need smart growth policies to control urban sprawl?
7. Are genetically modified organisms (GMOs) in crops and livestock sustainable?
8. Controlling the spread and devastation of AIDS and HIV
9. Controlling the spread and devastation of malaria
10. Is the world's use of soil resources sustainable?
11. Are we running out of economical energy sources?
12. Is hydropower development a sustainable source of energy?
13. Can U.S. agriculture help reduce global warming?
14. Solutions to water shortages in China
15. Indoor air pollution in developing countries
16. Obesity as a worldwide health problem
17. Controlling non-point source pollution from agriculture
18. Greenhouse gas emissions reductions trading
19. Reducing pollution from U.S. agriculture
20. Should the World Trade Organization (WTO) be abolished? Reformed? Left alone?
21. Acid rain damage to forests
22. Should we rely more on markets for sustainable development?
23. Should Virginia lift the ban on uranium mining?

### *Debate format and grading*

Oral debate. One week prior to the debate each team should provide the class with a reading source that supports their side of the argument for the topic. This can be a web reading or other source. Prior to the debate the two teams debating an issue will exchange one question which will be used to open the debate. At the beginning of the debate, each team will present a ten minute statement of their position on the issue. Oral presentations **must use visual aids that have been developed using Microsoft PowerPoint**. Powerpoint presentations should be submitted to the instructor prior to the debate or brought to class on a flash drive. The question for the other team should be included in the Powerpoint presentation. After opening presentations, questions will be taken from the rest of the class. The team receiving the question will have up to 3 minutes to

respond to the question and the other team 2 minutes for rebuttal. At the end of the debate, each team will have up to 3 minutes for a concluding statement.

Students will be graded on how well prepared they are for the debate and how well they represent and defend their views. Factors considered in grading debates include 1) organization and clarity of opening arguments; 2) use of supporting evidence including assigned and outside readings; 3) sound reasoning; 4) responsiveness to questions; and 5) use of visual aids. A participation grade will also be assigned to the students not in the debate based on the questions they provide.

Written report. Each student will write an individual report making the case for their side of the debate in which they were involved. Written reports will include 1) an introductory statement of the issue and your position, 2) main body in which you outline your arguments for your position, 3) conclusions, in which you briefly restate your position and supporting reasoning, and 4) list of references. Reports should be 4-6 pages long including references (double spaced, 1-inch margins, 12-point font). Reports will be graded on 1) Organization. Are the sections of the report presented in a clear, logical, and cohesive manner? 2) Persuasiveness. Are the arguments expressed in a clear, logical fashion using supporting evidence? 3) Style and clarity. Is the paper written with proper grammar, spelling, and punctuation? Are sentences and paragraphs easy to follow? 4) Documentation. Are footnotes or citations used to show where references support contentions of the essay? Are references clearly and completely shown in the list of references?

Grading. Fifty percent of the project final grade will be based on the oral debate and 50% will be based on the final written report. All team members will share in the grade for the oral debate. Team members will also be asked to evaluate each other's performance in debate preparation and delivery. These evaluations will be used as a part of the class participation grade.

Written reports will be submitted and graded individually. Five percent of the written report grade will be deducted for each day the assignment is late.

### **Empirical analysis (10% of final grade)**

Empirical analysis is essential to understanding and solving problems of sustainable development. Empirical analysis involves using data to examine trends, test hypotheses, conduct cost-benefit analyses, and to solve other types of problems. This exercise is intended to help you further develop your skills of obtaining and analysing data to better understand an issue of sustainable development. You are asked to conduct an analysis of one of the following topics or another topic of your choice. If you choose a topic not on the list, please clear it with the instructor first. After choosing your topic for analysis, you should obtain data related to the topic, perform the analysis of the data, and write up the analysis. Your writeup should include the following:

- 1) a discussion of the problem to which the data relate,
- 2) documentation of the procedures you used to analyse the data (for example how did you deflate a price series, or how did you fit a trend line to a series of data, etc.),

- 3) one or more graphs (generated using Excel or another package) to describe the analysed data,
- 4) a table reproducing the data you used and a complete reference to describe where the data were obtained, and
- 5) a discussion of the outcome of the data analysis. What did you learn from this analysis? What are the policy implications of the analysis? What are the limitations of the analysis?

The length of the paper should be 2-3 pages including table, graph, references, and text. You may work alone or in teams of two if you wish. If you work as a team, each member will receive the same grade.

For help on library resources and data availability, students may wish to contact the following library staff:

Margaret Merrill  
1330 Litton Reaves  
231-9670  
mmerrill@vt.edu

and

Caryl Gray  
5005 Newman Library  
231-9229  
[cegray@vt.edu](mailto:cegray@vt.edu)

### **Possible topics (or pick another topic and clear it with the instructor)**

#### **1. Natural resource price trends**

Pick a natural resource commodity (gold, oil, coal, etc.) and analyze its real (deflated) price trend. Test a hypothesis related to the trend. For example: Does the price trend indicate the commodity is becoming more scarce?

#### **2. Sustainability indicators**

Locate an ecological footprint calculator on the web or in another reference. Calculate the ecological footprint for yourself. Report the input data and outcome of the calculation. Then analyse the result using one of the following methods:

- a) Compare the results with those obtained using another footprint calculator (be sure to report the name and source for each calculator). If the results differ greatly, what might account for the difference?
- b) Perform sensitivity (scenario) analysis to determine what consumption items/assumptions your footprint is most sensitive to. What changes in consumption habits would result in the largest reductions in your estimated footprint?

#### **3. Population growth and living standards**

Test the hypothesis of a demographic transition, i.e. that population growth rates level off as per capita income increases by comparing population growth rates among nations with differing levels of income.

#### **4. Accommodating increased populations.**

Compute the land area required for living space to accommodate the projected 2.5 billion increase in world population by 2050. Assume the required living space per person is that of a standard U.S. or international city. How does this compare with the available land area that is suitable for living? What are the implications for the sustainability of projected population increases?

### **5. Food production**

Deflate and estimate the price trend of one or more food price item(s) (wheat, milk, etc.) Test the hypothesis that real food prices have been declining over time.

### **6. Water**

The Water Stress Index is used as a measure of water scarcity. Explain how the index is constructed and test the hypothesis that poorer countries are also more water stressed.

### **7. Coal mining**

Compute the percentage of U.S. energy needs met by coal over the past 50 years. Is there a trend? How does the trend relate to the price of coal relative to other energy sources (oil, natural gas).

### **8. Growth, markets, & trade**

Test the following hypothesis using cross country or cross state data: the availability of an environmental amenity (parks, forests, clean water, etc.) increases with income.

For example: see the cross country deforestation and income data provided by Antle and Heidebrink (“Environment and Development: Theory and International Evidence” Economic Development and Cultural Change. 1995: 603-625.)

### **9. Globalization**

Examine the trend in world trade as a percentage of total world GDP over the past 30 years. Test the hypothesis that worldwide trade has been increasing in real terms.

### **10. Global warming**

Some critics argue that spending money to avert global warming is too expensive, i.e. that the opportunity cost of funds invested in reducing greenhouse gas emissions exceeds the benefits. Find and critically evaluate an example of this argument.

### **11. Deforestation**

Examine the relationship between worldwide deforestation trends and real (deflated) lumber prices. Test the hypothesis that deforestation is associated with higher real prices for lumber products.

### **12. Urban sprawl**

Critics argue that urban sprawl consumes valuable agricultural land and will result in higher food prices. Examine the relationship between land converted to residential development and real food prices in the U.S.

### **13. International poverty, foreign aid, and sustainability**

Critics argue that much foreign aid is motivated by political reasons rather than need of the recipient country. Examine the relationship between foreign aid and poverty. Test the hypothesis that countries with a lower level of per capita income receive more foreign aid per capita.

#### *Debate and Reports Schedule*

September 18: Teams submit a brief statement indicating their choice of topic and who will debate which side of the issue.

October 21, 30, November 4, 13, and 18. Oral debates.

November 20 Empirical analysis papers due

December 9 Debate reports due.

## Class Schedule

<i>Date</i>	<i>Topics</i>
August 26	Introduction
August 28	In search for sustainability—interpreting the evidence. Lomborg-Intro pp 3-33.
September 2	Economics and sustainability—Daly-economics-full-world
September 4	Economics and sustainability— Sagoff-carrying capacity
September 9	Can we measure sustainability? Sustainability indicators — WWF International
September 11	Sustainability indicators — Costanza et al; Sagoff-price-on-nature
September 16	Population growth—Ehrlich-Anne-population pp. 78-97.
September 18	Food production –Rosegrant et al.-food
September 23	Water- Rosegrant et al.-water
September 25	Water and Institutional Reforms—Rosegrant and Binswanger
September 30	Mountaintop removal coal mining – <b>field trip</b> . Daniels and Zipper
October 2	Mountaintop removal coal mining-Fox
October 7	Growth, markets, & trade—problem or solution? Dasgupta
October 9	Rebuttal—Arrow et al, Ayres
October 14	Globalization—Lukas-free-trade;
October 16	Rebuttal— Daly-trade
October 21	Class debates
October 23	Global warming—IPCC 2007 report
October 28	Global warming— Lomborg-chill-out
October 30	Class debates
November 4	Class debates
November 6	Deforestation—UN FAO; Matthews-forests
November 11	Deforestation and institutional reforms—Bulte and Engel-forest-conservation
November 13	Class debates
November 18	Class debates
November 20	Urban sprawl—Squires-sprawl
December 2	Urban sprawl— Gordon and Richardson
December 4	International poverty, foreign aid, and sustainability—Sachs, Bandow-foreign aid
December 9	International poverty, foreign aid, and sustainability—Sharma
Dec 17 (2:05-4:05)	Final exam period

## Reading List

All readings are on Blackboard (under the filename indicated in boldface) unless otherwise indicated.

### I. In Search for Sustainability: Interpreting the Evidence.

Lomborg, pp 3-33. (**Lomborg-intro**)

### II. Conventional Economics and Ecological Economics: Contributions to Identifying Sustainability?

Daly, Herman. "Economics in a Full World." *Scientific American* 293(September 2005): 100-107. (**Daly economics full world**)

Sagoff, Mark. "Carrying Capacity and Ecological Economics." *BioScience* 45(October 1995): 610-619. On-line at <http://www.puaf.umd.edu/papers/sagoff.htm>. (**sagoff-carrying capacity**)

### III. Can We Measure Sustainability?

#### A. Physical Indicators: Can We Calculate "Carrying Capacity?"

WWF International. Living Planet Report 2006. Gland, Switzerland. pp. 14-39. (**WWF International**)

#### B. Monetary Indicators: Can We Value the Ecosystem?

Costanza, Robert, Ralph D'Arge, Rudolf DeGroot, Stephen Farber, Monica Grasso, Bruce Hannon, Karin Limburg, Shahid Naeem, Robert V. O'Neill, Jose Paruelo, Robert G. Raskin, Paul Sutton, and Marjan van den Belt. "The Value of the World's Ecosystem Services and Natural Capital." *Nature* (May 15, 1997): 253-260. (**Costanza et al**)

Sagoff, Mark. "Can We Put a Price on Nature's Services?" *Philosophy and Public Policy* 17 (Summer 1997): 7-12. Online at <http://www.puaf.umd.edu/ippp/nature.htm>. (**sagoff-price on nature**)

### IV. Sustainable Development Debates

#### A. Population and Food Production: Can We Feed 6 Billion People? 8 Billion? 12 Billion?

Ehrlich, Anne H. "Overshoot: Interrelations Between Population, Consumption, and Ecosystems." Chapter 5 in *Sharing the Planet*. Eburon Publishers. 2003. (**Ehrlich-Anne-population**)

Rosegrant, Mark W., Michael S. Paisner, Siet Meijer, Julie Witcover. 2020 Global Food Outlook Trends, Alternatives, and Choices: A 2020 Vision for Food, Agriculture, and the Environment Initiative Washington, D.C.: International Food Policy Research Institute  
August 2001. **(Rosegrant et al-food)**

## **B. Are We Running out of Water?**

Rosegrant, Mark W. Ximing Cai, and Sarah A. Cline. Global Water Outlook to 2025 Averting an Impending Crisis. A 2020 Vision for Food, Agriculture, and the Environment Initiative. International Food Policy Research Institute. Washington, D.C., U.S.A. and International Water Management Institute. Colombo, Sri Lanka. September 2002 **(Rosegrant et al-water)**

Rosegrant, Mark W. and Hans P. Binswanger. "Markets in Tradable Water Rights: Potential for Efficiency Gains in Developing Country Water Resource Allocation." *World Development* 22(1994): 1613-1625. **(Rosegrant and Binswanger)**

## **C. Mountaintop Removal Coal Mining: Economic Necessity or Blight on the Landscape?**

Daniels, W. L. and C. E. Zipper 1997. "Creation and Management of Productive Mine Soils". Publication 460-121. Blacksburg, Virginia, Virginia Cooperative Extension: 12. **(Daniels and Zipper)**

Fox, J. 1999. "Mountaintop Removal in West Virginia: An Environmental Sacrifice Zone." *Organization & Environment* 12(2): 163-183. **(Fox)**

## **D. Is Economic Growth Good or Bad for the Environment?**

Dasgupta, Susmita, Benoit Laplante, Hua Wang, and David Wheeler. "Confronting the Environmental Kuznets Curve" *Journal of Environmental Perspectives* 16(2002): 147-168. **(Dasgupta)**

Arrow, Kenneth, Bert Bolin, Robert Costanza, Partha Dasgupta, Carl Folke, C.S. Holling, Bengt-Owe Jansson, Simon Levin, Karl-Goran Maler, Charles Perrings, and David Pimentel. "Economic Growth, Carrying Capacity, and the Environment." *Ecological Economics* 15 (1995): 91-95. **(Arrow et al)**

Ayres, Robert U. "Economic Growth: Politically Necessary but Not Environmentally Friendly" *Ecological Economics* 15 (1995): 97-99. **(Ayres)**

## **E. Are Globalization and Free Trade the Answer to Sustainable Development?**

Lukas, Aaron. "WTO Report Card: Globalization and Developing Countries." Trade Briefing Paper No. 10. Center for Trade Policy Studies, CATO Institute, June 20, 2000. Online at <http://www.freetrade.org/pubs/briefs/tbp-010.pdf>. (**Lukas free trade**)

Daly, Herman. "Free Trade and Globalization vs. Environment and Community" Chapter 10 in *Beyond Growth* pp.145-157, Boston: Beacon Press, 1996. (**Daly-trade**)

## **F. Global Warming: Hot Air or Global Nightmare?**

IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. (**IPCC 2007 Report**).

"Chill out. Stop fighting over global warming -- here's the smart way to attack it." Bjorn Lomborg Sunday, October 7, 2007; Page B01.

**Not on Blackboard.** Available at: <http://www.washingtonpost.com/wp-dyn/content/article/2007/10/05/AR2007100501676.html>  
(**weblink available on Blackboard**)

## **G. Deforestation: Are We Losing Our Forests?**

U.N. Food and Agricultural Organization (FAO). How Fast Are Forests Disappearing? 2007. **Not on Blackboard.** Available at <http://www.greenfacts.org/en/forests/index.htm#2>  
(**weblink available on Blackboard**)

Matthews, Emily. "Understanding the FRA 2000." World Resources Institute Forest Briefing No. 1. Washington D.C. March 2001. (**Matthews-forests**)

Bulte, Erwin and Stefanie Engel. Conservation of Tropical Forests: Addressing Market Failure. Chapter 13 in *Economic Development and Environmental Sustainability* (Ramon Lopez and Michael Toman, eds). New York: Oxford University Press, 2006.  
(**Bulte and Engel-forest conservation**)

## **H. Is There Anything Wrong with Urban Sprawl?**

Squires, Gregory D. "Urban Sprawl and the Uneven Development of Metropolitan America." Chapter 1, *Urban Sprawl: Causes, Consequences, and Policy Responses*, pp 1-22. Washington, D.C.: The Urban Institute Press, 2002. (**Squires-sprawl**)

Gordon, Peter, and Harry Richardson, "Critiquing Sprawl's Critics." *Policy Analysis* CATO Institute, January 24, 2000. No. 365. 18 pp. On-line at <http://www.cato.org/pubs/pas/pa-365es.html>. (**Gordon and Richardson**)

## **I. Addressing International Poverty: Is Foreign Aid Necessary?**

Sachs, Jeffrey D.. "Can Extreme Poverty Be Eliminated?." *Scientific American* 293(September 2005): 56-65. (**Sachs**)

Bandow, Doug "Help or Hindrance: Can Foreign Aid Prevent International Crises?" Cato Policy Analysis No. 273. Washington, D.C.: The Cato Institute, April 1997. Online at <http://www.cato.org/pubs/pas/pa-273.html>. (**Bandow-foreign aid**)

Sharma, Shalendra. "The Encouraging Truth about Foreign Aid." *Challenge* 48(July-August 2005): 11-25. (**Sharma**)