Overview:

As the global population grows and the world becomes more industrialized the human impact on the global environment also increases. This class will examine a set of global environmental issues. Topics will include those which affect the global commons such as ozone layer depletion and climate change including the implications of energy technology choices, and those which are of widespread regional importance such as the impacts of air pollution on human health and welfare, loss of biological diversity and ecosystem services, and issues of sustainable development. For each topic the course will first examine the scientific basis of the problems and will then examine current and possible future policy responses.

Course Format:

Course topics will usually be covered in modules with the first part of the module covering the key scientific concepts surrounding the environmental issue and the second describing the present and possible future policy responses. Class meetings will be divided, very roughly, into half lecture and half discussion. All students are expected to do the required weekly reading which will form the basis for classroom discussion. Most of the reading is in a course packet available for purchase and the rest is available over the internet with web addresses noted below in the syllabus. A substantial portion of the course grade will be based on class participation.

Grading:

Grades will be based on class participation, a presentation and a mid-term and final paper. The following percentages will be used:
Class participation: 30%
Midterm presentation: 5%
Paper in lieu of midterm: 20%
Presentation of final paper: 10%
Final paper: 35%
SCHEDULE OF CLASSES


Drivers influencing global environmental problems – growth in population and consumption, increasing global energy consumption, habitat loss. Disparity in wealth and consumption between developed and developing countries.

Reading:


Week 2. September 26, 2005. Stratospheric Ozone Depletion – Science

Ozone in the stratosphere protects life on earth from excess ultra-violet (UV) radiation. It has been depleted at all latitudes except the tropics by the emission of anthropogenic (human produced) chlorofluorocarbons (CFCs) and related substances. Increases in UV radiation at the earth’s surface result in an increase in the incidence of skin cancer, eye cataracts, decrease in productivity of some ecosystems, and a decrease in air quality. A near global phase-out of the production of CFCs is expected to permit a partial recovery of the ozone layer later this century.

Reading:

An introduction to the science of stratospheric ozone depletion and reasons behind the global phase-out of chlorofluorocarbons (CFCs) has been compiled by the U.S. Environmental Protection Agency and is posted at: http://www.epa.gov/ozone/science/sc_fact.html

An international assessment evaluating the scientific understanding of ozone depletion is conducted every four years. The executive summary for the most recent report completed in 2002 is available at: http://www.unep.org/ozone/pdf/execsumm-sap2002.pdf

An excellent compilation by the 2002 international assessment committee of twenty questions and answers regarding the science of stratospheric ozone depletion is at: http://www.al.noaa.gov/WWWHD/pubdocs/assessment02/Q&As.pdf and is also included in your course packet.

The Montreal Protocol, an international treaty to protect stratospheric ozone, has resulted in a near global phase-out of CFCs and related substances. This treaty is considered one of the world’s global environmental success stories. We’ll explore what made it possible and the lessons that can be taken from it to address other global environmental problems.

Reading:

If you are interested in reading more of the book, I have put several chapters on course E-reserve.


Human activities, primarily the burning of fossil fuels such as coal, oil and natural gas, and deforestation are increasing the concentrations of gases in our atmosphere which trap heat. The IPCC, set up in 1988 by UNEP and the World Meteorological Organization, and composed of scientists from around the world, reviews the state of scientific knowledge on climate change and issues comprehensive reports every 5-years. We will examine the current understanding and evidence for climate change as well as its potential future impacts.

Reading:

The entire three part report on climate change written by the Intergovernmental Panel on Climate Change (IPCC) is available on the web at: http://www.ipcc.ch/ However, for class, please focus on: Climate Change 2001: Synthesis Report, Summary for Policymakers by the Intergovernmental Panel on Climate Change (IPCC), in your course packet. If you’d like more scientific information, you can read the Technical summary at: http://www.ipcc.ch/pub/wg1TARtechsum.pdf.

The Arctic Climate Impact Assessment was released in 2004 and key findings are summarized in the Highlights included in your packet. Impacts of a Warming Arctic: Arctic Climate Impact Assessment. Highlights [2004]. Brochure (18 pages) produced by the Arctic Climate Impact Assessment (ACIA).


Do technologies exist that will permit us to reduce the emission of greenhouse gases sufficiently to stabilize climate? We will examine current perspectives on this topic. The Framework Convention on Climate Change (FCCC) was signed at the 1992 Earth Summit in Rio and put the issue of climate change on the international stage. The Kyoto Protocol, negotiated in December 1997, introduced the first commitments to reduce emissions of greenhouse gases by developed countries and went into effect, without
participation from the United States, February 16, 2005. We will examine similarities and differences between the policy approach to climate change and stratospheric ozone depletion.

**Reading:**


Week 6. October 24, 2005. Mid-term presentations

Mid-term paper due: Thursday October 27, 2005 by noon.

Fall Break

Week 7. November 7, 2005. Air Pollution -- Science and Impacts on Health and Agriculture

Emissions of precursors to acid rain, ozone and particulate pollution all come from fossil fuel combustion and biomass burning and have been controlled largely due to their impacts on health. These pollutants can be transported long distances and effect regions outside the countries where they were emitted. We will examine differences between pollution levels in developed and developing countries.

**Reading:**


**Week 8. November 14, 2005. Policy responses to air pollution and acid rain -- Command and control versus market based mechanisms, Long Range Transboundary Air Pollution treaty, etc.**

**Readings:**


Description of the Long Range Transboundary Air Pollution Treaty (LRTAP) [http://www.unece.org/env/lrtap/lrtap_h1.htm](http://www.unece.org/env/lrtap/lrtap_h1.htm)


Continuing and accelerating destruction of biodiversity threatens to impair the natural ecosystem infrastructure supporting human society and economic systems. Extinction is permanent. The root causes include habitat loss, deforestation, water degradation, urban expansion, introduction of non-native species, lack of enforcement of environmental regulations, etc. We will examine the natural distribution of biodiversity on earth and the extent of biodiversity loss.

**Reading:**

John Terborgh, Diversity and the Tropical Rain Forest, Chapter 1: The Biological Exuberance of the Tropics, pp. 1-29; Chapter 3: The Global Diversity Gradient, pp. 53-71; Chapter 8: Conserving Biodiversity pp.185-211; Chapter 9: Managing Tropical Forests, pp. 213-232.


Various efforts are being made to protect biodiversity including the establishment of national parks, the passage of the U.S. Endangered Species Act and the international Convention on Biological Diversity following the 1992 'Earth Summit' in Rio de Janeiro. We will examine how much these initiatives are helping stem the rapid loss of biodiversity and will explore what else might help.

**Reading:**


**Week 11. December 5, 2005 Sustainable Development**

*This class may be postponed to December 12, 2005.*

What can be done to encourage the use of natural resources in a sustainable fashion?

**Reading:**


  Read Goals and targets, 10 key recommendations, Why the goals are important, Country processes, International actions, Costs and benefits.


**Week 12 December 12, 2005  Summary and Final Discussion**

**Reading Period:** Oral reports by students of term projects. Monday January 9 and a second date to be determined.

**Final term papers due:** Monday January 16, 2003.