Lab this week:
meet 1230 s-side BSE 328 on 01 Dec

Housekeeping, 28 November 2006

-Thank our speakers…
-Exam Key on website

Today: Economics and Sustainable Development (Ch12)

Thurs 30 Nov: Forbes Lobby Creativity Project
Tues 05 Dec: Final day of class
Thurs 14 Dec: Final Exam 1100-1300h in this room

Short oral presentations:
28 Nov - Amanda and Fred
Global Climate Change Lecture Series
All lectures will take place at UA Centennial Hall.

All lectures begin at 7pm and are free to the public. Call 520.621.4090 for more information.

http://cos.arizona.edu/climate/

Tuesday, October 17
Global Climate Change: The Evidence
Malcolm Hughes, Professor of Dendrochronology

Tuesday, October 24
Global Climate Change: What's Ahead
Jonathan Overpeck, Director of the Institute for the Study of Planet Earth and Professor of Geosciences

Tuesday, October 31
Global Climate Change: The Role of Living Things
Travis Huxman, Assistant Professor of Ecology and Evolutionary Biology

Tuesday, November 7
Global Climate Change: Ocean Impacts and Feedbacks
Julia Cole, Associate Professor of Geosciences

Tuesday, November 14
Global Climate Change: Disease and Society
Andrew Comrie, Dean of the Graduate College and Professor of Geography and Regional Development

Tuesday, November 21
Global Climate Change: Could Geoengineering Reverse It?
Roger Angel, Regents' Professor of Astronomy

Tuesday, November 28
Global Climate Change: Designing Policy Responses
Paul Portney, Dean of the Eller College of Management and Professor of Economics
Science a la Joe Camel  Conservation, Economics, and Education

By Laurie David, Washington Post  Sunday, November 20, 2005, B01

At hundreds of screenings this year of “An Inconvenient Truth,” the first thing many viewers said after the lights came up was that every student in every school in the United States needed to see the movie. The producers of former vice president Al Gore’s film about global warming, myself included, certainly agreed. So the company that made the documentary decided to offer 50,000 free DVDs to the National Science Teachers Association (NSTA) for educators to use in their classrooms. It seemed like a no-brainer.

The teachers had a different idea. Thanks but no thanks, they said.

In their e-mail rejection, they expressed concern that other “special interests” might seek to distribute materials, too; they said they didn’t want to offer “political” endorsement of the film; and they saw “title, if any, benefit to NSTA or its members” in accepting the free DVDs.

Gore, however, is not running for office, and the film’s theatrical run is long since over. As for classrooms benefits, the movie has been enthusiastically endorsed by leading climate scientists worldwide and has won the Nobel Peace Prize.

Still, maybe the NSTA just being extra cautious. But there was one more curious argument in the e-mail: Accepting the DVDs, they wrote, would place “unnecessary risk upon the [NSTA] capital assets.”

That’s the same Exxon Mobil that for more than a decade has done everything possible to muddle public understanding of global warming and stifle any serious effort to solve it. It has run ads in leading newspapers (including this one) questioning the role of manmade emissions in global warming, and financed the work of a small band of scientific skeptics who have tried to challenge the consensus that heat-trapping pollution is drastically altering our atmosphere.

The company spends millions to support groups such as the Competitive Enterprise Institute that aggressively pressure lawmakers to oppose emission limits.

It’s bad enough when a company tries to sell junk science to a bunch of grown-ups. But, like a tobacco company using cartoons to peddle cigarettes, Exxon Mobil is going after our kids, too. And it has been doing so for far longer than you might think. NSTA says it has received $8 million from the company since 1996, mostly for the association’s “Building a Presence for Science” program, an electronic networking initiative intended to bring standards-based teaching and learning into schools, according to the NSTA Web site. Exxon Mobil has a representative on the group’s corporate advisory board. And in 2003, NSTA gave the company an award for its commitment to science education. So much for special interests and implicit endorsements.

In the past year alone, according to its Web site, Exxon Mobil’s foundation gave $42 million to key organizations that influence the way children learn about science, from kindergarten until they graduate from high school.

And Exxon Mobil still isn’t the only one getting it on the action. Through textbooks, classroom posters and teacher seminars, the oil industry, the coal industry and other corporate interests are exploiting shortfalls in education funding by using a small slice of their record profits to buy themselves a classroom soapbox.

NSTA’s list of corporate donors also includes Shell Oil and the American Petroleum Institute (API), which funds NSTA’s Web site on the science of energy. There, students can find a section called “Running on Oil” with a page that touts the industry’s environmental track record — citing improvements mostly attributable to laws that the companies fought tooth and nail, by the way — but makes only vague references to spills or pollution. NSTA has distributed a video produced by API called “You Can’t Be Cool Without Fuel,” a shameless pitch for oil independence.

The education organization also hosts an annual convention — which is described on Exxon Mobil’s Web site as featuring “more than 400 companies and organizations displaying the latest current products and services” — at which corporate representatives from ExxonMobil, the oil industry, and other corporate interests like Weyerhaeuser and International Paper, Borowski says, and the curricular offerings included lessons on forestry provided by Weyerhaeuser and International Paper. Borowski says, and the benefit of genetics engineering courtesy of Bolsa Grande Monkeys.

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The materials from the American Petroleum Institute and the other corporate interests are the worst form of a lie: omission,” Borowski says. “The oil and coal guys won’t address global warming, and they have the money to keep their message in education.

Along with propaganda challenging global warming from Exxon Mobil, the curriculum offerings included lessons on forestry provided by Weyerhaeuser and International Paper, Borowski says, and the benefit of genetics engineering courtesy of Bolsa Grande Monkeys.

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An API memo leaked to the media as long ago as 1998 succinctly explains why the association is angling to infiltrate the classroom: “Informing teachers/students about uncertainties in climate science will begin to erode barriers against further efforts to impose Kyoto-like measures in the future.”

So, how is any of this different from showing Gore’s movie in the classroom? The answer is that neither Gore nor Participant Productions, which made the movie, stands to profit a nickel from giving away DVDs, and we aren’t talking about modest donations from companies that make environmental pollution a theme, which can be viewed, renewable energy — this story shows that staying green stripes on a corporate tiger doesn’t change the beast within. The company is still playing the same cynical game it has for years.

While NSTA and Exxon Mobil posture the noble lesson they’re teaching with all this, there are 50,000 DVDs sitting in a Los Angeles warehouse, waiting to be distributed. In the meantime, Mom and Dad may want to keep a sharp eye on their kids’ science homework.

Laurie David, a producer of “An Inconvenient Truth,” is a Natural Resources Defense Council trustee and founder of StopGlobalWarming.org.

Figure 2.13 An Indonesian boy waving in a polluted river suffers external costs. External costs are costs not borne by the buyer or seller; they may include water pollution, aesthetic harm, human health problems, property damage, harm to aquatic life, aesthetic degradation, declining real estate values, and other problems.

Brennan and Withgott 2005
Genuine Progress Indicator

Index of Sustainable Economic Welfare

Economic Growth vs. Development
- efficiency, sophistication, utility

[Nonrival (air to breathe) or nonexclusive goods (UV protection from ozone)]

- Producer Pays/Polluter Pays
- Dramatically less waste (packaging, scrubber sludge)
- Taxation/Subsidies
- Pollution Rights
- Precautionary Principle

Product itself

Government strategies and regulation
- Stable, democratic government required?
Economics Primer...

**FIGURE 2.1 Supply and Demand.** The market clears at price $P_0$ and quantity $Q_0$. At the higher price $P_1$, a surplus develops, so price falls. At the lower price $P_2$, there is a shortage, so price is bid up.

Pindyck and Rubinfeld 1992

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**Marginal revenue**

**Example of Profit Maximization**

\[ MR = \frac{dTR}{dQ} \]

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**Marginal cost**

\[ MC = \frac{dTC}{dQ} \]

Wikipedia, 14 Nov 2006
Adam Smith 1909 (voluntary transactions)

*Invisible Hand* – “turning selfish, uncoordinated actions into increased prosperity and relative social harmony”

- Tragedy of the Commons
- Externalities
- Private Property

**Market Failure**
resources misallocated:
“a few individuals or businesses benefit at expense of the larger society” (Primack 2006)

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**Traditional Neoclassical Economics (Miller 2003):**

- **Command**
  - government

  ~ monopoly
  ~ global free trade
  gov't subsidies/tax breaks/"insurance"
  withhold information
  maximize profits (pass costs to others, future)

- **Free Market**
  - markets
  - competition
  - information
  - full cost pricing

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**Capitalist Market System**
nomadic Maasai

**Private Property?**

Table 28.1 Water use by people in different sorts of communities in Arabia. People in indigenous desert settlements use one-tenth the water of people in modern towns. The figures are for all domestic water use, including drinking, washing, bathing, and other water demands.

<table>
<thead>
<tr>
<th>Type of community</th>
<th>Domestic water use per person (L/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern Arabian town without major industry*</td>
<td>340</td>
</tr>
<tr>
<td>Traditional agricultural village</td>
<td>120</td>
</tr>
<tr>
<td>Small desert settlement with supply by government water truck</td>
<td>80</td>
</tr>
<tr>
<td>Small desert settlement with traditional water supply</td>
<td>28</td>
</tr>
</tbody>
</table>


* New York City has a similar usage rate.

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Throughput

2nd Law of Thermodynamics

Wright and Nebel 2002
Internal Market Costs

vs.

Externalities

-External to Market Forces

-Noise
-Pollution
-Acid rain
-Erosion
-Global Warming
-Eutrophication
-Disease
-Asthma
-Birth Defects
-Behavior and Intelligence
Index of Sustainable Economic Welfare
(p. 355 Van Dyke 2003)

1 Income Distribution
2 Net Capital Growth
3 Natural Resource Depletion/Environmental Damage
4 Unpaid Household Labor

(social and environmental justice)
Herman Daly
Former Environmental Economist with Worldbank
Professor at U. Maryland

Utility vs. Throughput
Utility not measurable; it is an experience

Circulatory system vs. digestive system
(perpetual motion machine)

Wealth vs. Ilth (accumulation of goods vs. bads)

Micro vs. Macro economics
(MR=MC vs. endless)

If resources infinite then price = 0,
but if pay for resources then can redistribute wealth

Center for the Advancement of the
Steady State Economy

http://www.steadystate.org/Index.html
utility curves

FIGURE 3.3  An Indifference Map. An indifference map is a set of indifference curves that describes a person's preferences. Any market basket on indifference curve \( U_2 \) such as market basket A, is preferred to any market basket on curve \( U_1 \), e.g., basket B, which in turn is preferred to any market basket on \( U_2 \), such as D.

Pindyck and Rubinfeld 1992

utility curves

FIGURE 3.11  Maximizing Consumer Satisfaction. When the budget line and the indifference map are combined, consumers maximize their satisfaction by choosing A. At this point the budget line and indifference curve \( U_1 \) are tangent, and no higher level of satisfaction can be attained. At A, the point of maximization, the marginal rate of substitution between the two goods equals the price ratio. At B, however, the marginal rate of substitution (1) is greater than the price ratio (1/2), and maximization does not occur.

Pindyck and Rubinfeld 1992
<table>
<thead>
<tr>
<th>Ecosystem Service*</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas regulation</td>
<td>Carbon dioxide/oxygen balance, ozone for protection against ultraviolet light</td>
</tr>
<tr>
<td>Climate regulation</td>
<td>Greenhouse gas regulation, dimethyl sulphide production affecting cloud formation</td>
</tr>
<tr>
<td>Disturbance regulation</td>
<td>Storm protection, flood control, drought recovery, and other aspects controlled by vegetation structure</td>
</tr>
<tr>
<td>Water regulation</td>
<td>Provisioning of water for agricultural (such as irrigation) or industrial (such as mining) processes or transportation</td>
</tr>
<tr>
<td>Water supply</td>
<td>Provisioning of water by watersheds, reservoirs, and aquifers</td>
</tr>
<tr>
<td>Erosion control and sediment retention</td>
<td>Prevention of loss of soil by wind, runoff, or other removal processes; storage of soil in lakes and wetlands</td>
</tr>
<tr>
<td>Soil formation</td>
<td>Weathering of rock and the accumulation of organic material</td>
</tr>
<tr>
<td>Nutrient cycling</td>
<td>Nitrogen fixation, nitrogen, phosphorus, and other elemental or nutrient cycles</td>
</tr>
<tr>
<td>Waste treatment</td>
<td>Waste treatment, pollution control, desalination</td>
</tr>
<tr>
<td>Pollination</td>
<td>Provisioning of pollinators for the reproduction of plant populations</td>
</tr>
<tr>
<td>Biological control</td>
<td>Keystone predator control of prey species; reduction of herbivory by top predators</td>
</tr>
<tr>
<td>Refugia</td>
<td>Nurseries, habitat for migratory species, regional habitats for locally harvested species, or overwintering grounds</td>
</tr>
<tr>
<td>Food production</td>
<td>Production of fish, game, crops, nuts, and fruits by hunting, gathering, subsistence farming, or fishing</td>
</tr>
<tr>
<td>Raw materials</td>
<td>The production of lumber, fuel, or fodder</td>
</tr>
<tr>
<td>Genetic resources</td>
<td>Medicine, products for materials science, genes for resistance to plant pathogens and crop pests, ornamental species (pets and horticultural varieties of plants)</td>
</tr>
<tr>
<td>Recreation</td>
<td>Ecotourism, sport fishing, and other outdoor recreational activities</td>
</tr>
<tr>
<td>Cultural</td>
<td>Aesthetic, artistic, educational, spiritual, and/or scientific values of ecosystems</td>
</tr>
</tbody>
</table>

*Ecosystem "services" are linked to ecosystem "functions".

Source: Adapted with permission from Robert Costanza et al., "The value of the world’s ecosystem services and natural capital," Nature, May 1997.

Brennan and Withgott 2005