Upcoming Readings

today: Ch 12, and web-links (Economics)

Tues 20 Nov: professional panel (TNC, USFWS, NPS)
  -bring a question, hand it in at beginning to me

Tues 27 Nov: Galapagos Debate Links
  -Debate on 27 Nov
  -Grading Criteria due 27 Nov
  -Creativity on 29 Nov,

Conservation Biology Lab 406L/506L

Friday 30 Nov 1230 -> 1530, Wrap Up
  Meet 1230h southwest corner of BSE

See lab website for more information
Debate 15 November 2007, **MOVED TO 27 NOV.**
RE: Galapagos Conservation

Three groups – one will debate, another will evaluate, third will observe, then we rotate.

<table>
<thead>
<tr>
<th>Debate 1 (20 Sept.)</th>
<th>Debate 1 (20 Sept.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A debate</td>
<td>506 A assist</td>
</tr>
<tr>
<td>Group B evaluate</td>
<td>506 B assist</td>
</tr>
<tr>
<td>Group C observe</td>
<td>506 C observe</td>
</tr>
<tr>
<td></td>
<td>Debate 2 (23 Oct.)</td>
</tr>
<tr>
<td>Group A observe</td>
<td>506 A observe</td>
</tr>
<tr>
<td>Group B debate</td>
<td>506 B assist</td>
</tr>
<tr>
<td>Group C evaluate</td>
<td>506 C assist</td>
</tr>
<tr>
<td></td>
<td>Debate 3 (27 Nov.)</td>
</tr>
<tr>
<td>Group A evaluate</td>
<td>506 A assist</td>
</tr>
<tr>
<td>Group B observe</td>
<td>506 B observe</td>
</tr>
<tr>
<td>Group C debate</td>
<td>506 C assist</td>
</tr>
</tbody>
</table>

Grading Criteria due 27 November

Out of 100 points.

15 points for your grading effort of other pieces.

Also, tell us soon what resources (table, vertical board, power supply?) you will need.
Conservation, Economics, Sustainable Development

That which seems to be wealth may in verity be only the gilded index of far reaching ruin.

- John Ruskin, 1883

Traditional Neoclassical Economics:

Economy = system of production, distribution, and consumption of goods and services (scarcity)

Driven by wants and needs of govt, society, individuals

Decisions about
A. what goods and services
B. how produce
C. how much
D. how distribute

are made by individuals, governments, businesses

Supply and Demand

Use resources:
A. natural
B. human
C. financial
D. manufactured

Infinite Substitution?

to make goods and services
Economic Growth
-increase in capacity to provide goods and services
-accomplish with more people and/or more consumption

-measured as GNP (gross national product)
   -also known as GNI (gross national income)
-value of goods and services in a country
-can also compare the purchasing power of different countries for a common set of goods and services
   -(GNI PPP; gross national income in purchasing power parity)

-Can examine on a per capita basis as well

---

**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
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)
How is Economic Development Different?

Takes quality of life into account:
- life span
- infant mortality
- education
- health care
- environmental quality
- pollution
- clean air and water
- percent of population below poverty line
- etc.
“For poor women the only holiday is when you are asleep.”

Women:
- Do 2/3 of the work
- 10% of the income
- own 0.01% of the property
- 70% of the world’s poor
- 2/3 of the world’s illiterate

(page 87 Miller 2005)

Over the past 50 years, the federal government has provided more than $500 billion in subsidies to the fossil fuel and nuclear industries, investing a fraction of that in energy efficiency and renewable sources of energy such as wind, solar and geothermal. As a result, coal, nuclear power, oil and gas provide more than 91 percent of our electricity needs in the U.S. This dependence on fossil fuels carries severe public health consequences, including asthma attacks, respiratory disease, heart attacks, and premature deaths. Moreover, fossil fuels, such as coal and oil, pollute the environment from the point of extraction to combustion in the form of global warming, acid rain, oil spills and runoff pollution. At the same time, nuclear power has left us with a nuclear waste problem for which no safe solution exists.
Killing the Natives, Chapter 3

Sunday, November 26, 2006; B01

By Laurie David, Washington Post

Science a la Joe Camel

The education organization also hosts an annual convention -- which is described on Exxon Mobil's Web site as featuring "more than 450 companies and organizations displaying the most current

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 isn't the only one getting 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.

What's disturbing about this is that Exxon Mobil has been playing the same game for years -- and the company is still playing the same cynical game it has for years.

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 longer than you may think.

NSTA has distributed a video produced by API called "You Can't Be Cool Without Fuel," a shameless pitch for oil dependence.

"Running on Oil" and read 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 reference 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 dependence.

The education organization also hosts an annual convention -- which is described on Exxon Mobil's Web site as featuring "more than 450 companies and organizations displaying the most current

LESSON PLANS FOR THE CLASSROOM

Creating a Lesson Plan

Preparing a Lesson Plan

B. Objectives

1. What is the purpose of the lesson?

2. What knowledge or skills will students gain from the lesson?

3. How will the lesson contribute to students' understanding of the subject matter?

C. Materials

1. What resources are needed to carry out the lesson?

2. Are there any special equipment or materials required for the lesson?

D. Procedure

1. Outline the steps involved in the lesson.

2. How will the lesson be conducted?

3. What teaching strategies will be used to engage students?

E. Assessment

1. How will students be evaluated?

2. What criteria will be used to determine student performance?

F. Reflection

1. What反思 elements are included in the lesson plan?

2. How can the lesson plan be improved for future implementation?

G. References

1. What sources are cited in the lesson plan?

2. How do these sources support the lesson's objectives?

H. Appendices

1. Any additional information related to the lesson plan,

2. How are these appendices helpful in implementing the lesson plan?
An Indonesian boy wading 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

Figure 2.13

Figure 2.5 Comparison of the gross domestic product (GDP) and genuine progress indicator (GPI) along with the per capita values for these indicators (right) in the United States between 1950 and 1998. (Data from Clifford Cobb; Mary Sue Goodman, and Mathis Waltnermeyer)

VanDyke 2003

Figure 12.1 Figure 12.1 Comparison of the U.S. national product (GDP) and Index of Sustainable Economic Welfare (ISEW) since 1950. Although the GDP has increased, the ISEW has failed to grow.

Genuine Progress Indicator

Index of Sustainable Economic Welfare
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)
Internal Market Costs
vs.
Externalities
-External to Market Forces

-Noise
-Pollution
-Acid rain
-Erosion
-Global Warming
-Eutrophication
-Disease
-Asthma
-Birth Defects
-Behavior and Intelligence

Economic Growth vs. Development
- Efficiency, sophistication, utility

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

-Government strategies and regulation
- Stable, democratic government required?

[Nonrival (air to breathe) or nonexclusive goods (UV protection from ozone)]
In Eco-Friendly Factory, Low-Guilt Potato Chips

CASA GRANDE, Ariz. — At Frito-Lay’s factory here, more than 500,000 pounds of potatoes arrive every day from New Mexico to be washed, sliced, fried, seasoned and portioned into bags of Lay’s and Ruffles chips. The process devours enormous amounts of energy, and creates vast amounts of wastewater, starch and potato peelings.

Over the next several years, Frito-Lay plans to install high-tech filters that would recycle most of the water used to rinse and wash potatoes, as well as the corn used to make Doritos and other snacks, and then burn the leftover sludge to create methane gas to run the plant’s boiler. The company will also build at least 50 acres of solar concentrators behind the plant to generate solar power. A biomass generator, which will probably burn agricultural waste, is also planned to provide additional renewable fuel.

The retrofit of the Casa Grande factory, scheduled to be completed by 2010, would reduce electricity and water consumption by 90 percent and its natural gas use by 80 percent. Greenhouse gas emissions would be cut by 50 percent to 75 percent, the company said.

Since 1999, Frito-Lay companywide has reduced its water use by 38 percent, natural gas by 27 percent and electricity by 21 percent, cutting $55 million a year in utility costs.
Frito-Lay officials maintain that trying net zero provides a hedge, particularly if the most pessimistic predictions about climate change and the availability of water and petroleum hold true.

“If the price of these resources continues to rise, we will be very happy we made these investments,” said Rich Beck, senior vice president for operations.

**Possible?**

Traditional Neoclassical Economics (Miller 2003):

Command -government  \( \rightarrow \) Capitalist Market System  \( \rightarrow \) Free Market

-markets  ~monopoly
-competition  ~global free trade
-information  gov't subsidies/tax breaks/"insurance"
-maximize profits (pass costs to others, future)
What do we spend our money on?


Wright and Nebel 2002

C: ~$436 billion
B: >$6.8 trillion

1:16 -> C:B

The Clean Air Act (1970, 1977, and 1990) has been the subject of open political debate between those who think its costs have been too high for industry, taxpayers, labor, and consumers and those who think the health and environmental benefits were justified. Compliance has altered patterns of industrial production, employment, and capital investment. Although these expenditures must be viewed as investments that have generated benefits and opportunities, the directives raise some questions about whether they have generated benefits and opportunities for all industry, such as steel. A recent study for the U.S. EPA was developed for a real cost/benefit study.

In 1990, Congress requested the EPA to answer the question, How do the overall health, welfare, and economic benefits of the Clean Air Act programs compare with the costs of those programs? In response, the EPA performed the most extensive, cost-benefit analysis of public policy ever attempted. Here is what the EPA reported in a 1996 study.

- The total direct cost of negotiating the Clean Air Act for all federal, state, and local rules from 1970 to 1990 was $57.8 billion (in 1990 dollars). This cost was borne by businesses, consumers, and government entities in the form of higher prices for many goods and services and for some utilities.

- This recent estimate of direct benefits from the Clean Air Act from 1970 to 1990 was $67.3 billion.

- Therefore, the net benefit of the Clean Air Act has been +$9.4 billion.

- "The finding is overwhelming: The benefits far exceed the costs of the Clean Air Act in the first 20 years," said Richard Maeght, associate administrator for policy planning and evaluation at the EPA. Further, for all benefits, the report states that "all benefits may be significantly underestimated due to the omission of large numbers of benefits from the monetized benefit estimates."

- The benefits to society, directly and indirectly, have been widespread across the entire population. The Clean Air Act has led to:
  - reduced air pollution (described in this chapter),
  - improved human health. Each year, 76,000 lives were saved, and there were 10,000 fewer heart attacks, 10,000 fewer stroke deaths, 73,000 fewer cases of emphysema, and 15 million fewer cases of respiratory illness.
  - "avoided cost": Improved health has meant less debilitating disease, less hospitalization, less need for special care, and less need for medicines.
  - low cost levels of lead, which is particularly harmful to children. In 1990, 220,000 tons of lead were not burned in gasoline, because of Clean Air Act measures. Because exposure to lead impairs the cognitive development of children, the huge reductions in lead levels produced a benefit of retained IQ and the possibility of a lower incidence of learning disabilities, less dependent life.
  - lowered cancer rates.
  - reduced sea and desert dust.

The EPA study results should encourage us to act for the health of our families. Society knows what to do, but action is difficult to achieve, despite the efforts of special interests and political parties, and despite substantial public concern and action.

In 1999, the EPA published a secret analysis of costs and benefits that showed the impact of the Clean Air Act of 1990 and its effects on expected costs and benefits in 2010. The findings are consistent with the EPA's previous analysis. According to the analysis, the new regulations will cost an estimated $27 billion, but will generate health and ecological benefits of about $10 billion. Estimates indicate that the health benefits will prevent 70,000 Americans from early death, more than 1.7 million disability-adjusted life years, 67,000 savings in deaths of cancer, chronic bronchitis, and 23,000 response-related hospital visits. Many of these benefits, such as those to crops and ecosystems, are difficult to put a dollar figure on. Thus, the benefits exceed the costs by a margin of over 2 to 1, but still sound like a pittance.

nomadic Maasai

TABLE 26.1 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>740</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>

Source: After Goodie and Wilkinson 1977. *New York City has a similar usage rate. (Hill et al. 2004)

2nd Law of Thermodynamics

Wright and Nebel 2002
### Table 2.1 Ecosystem Services and Functions

<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 sulfoxide 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 milling) 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 silt 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, denitrification</td>
</tr>
<tr>
<td>Pollution</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 "goods" are listed in ecosystem services.

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

![Figure 24-5](image.png) The development cycle spawned by the Highway Trust Fund.

Wright and Nebel 2002
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 3.2 An Indifference Curve. A person’s indifference curve $I_i$ shows all market baskets that generate the same level of satisfaction as does market basket $A_i$. The person prefers market basket $B_i$, which lies above $I_i$, to $A_i$, but prefers $A_i$ to market basket $D_i$, which lies below $I_i$.

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 an indifference curve $I_i$ such as market basket $A_i$ is preferred to any market basket on curve $I_j$ (e.g., basket $B_j$), which in turn is preferred to any market basket on $I_k$, such as $D_j$.

Pindyck and Rubinfeld 1992
Warren Buffett: Tax Inherited Estates

By LAURIE KELLMAN - 14 Nov 2007

Billionaire Warren Buffett told the Senate Finance Committee on Wednesday that Congress should keep the estate tax rather than repeal it and help a few rich Americans like him.

"I think we need to ... take a little more out of the hides of guys like me," Buffett told the panel.

One of the world's richest men and biggest philanthropists, Buffett has been outspoken against efforts, mostly by Republicans, to repeal or reduce the federal tax on inheritances. Democrats argue that a repeal would amount to a huge windfall for the nation's wealthiest families.

Estates worth up to $2 million this year and next will be exempt from the federal estate tax. Portions of estates above that threshold will be taxed at 45 percent.

In 2009, the exemption level rises to $3.5 million, and by 2010 the estate tax will be repealed — but only for a year. Unless Congress changes the law, it comes roaring back in 2011 with an exemption threshold of only $1 million and a top tax rate of 55 percent.

Buffett said inheritance taxes preserve a measure of meritocracy, and with it opportunity, by recycling portions of great wealth through public coffers.

"The resources of society I don't think should pass along in terms of an aristocratic dynasty of wealth," Buffett told the panel. "I believe in keeping equality of opportunity as much as you can in this country."

Committee Chairman Max Baucus, D-Mont., citing information from the IRS, said that of nearly 2.5 million deaths in 2004, about 19,300 estates paid the estate tax.
Avoiding the Crisis Mentality

Only when the last tree has died and the last river been poisoned and the last fish been caught will we realise we cannot eat money.

Chief Seattle's Treaty