Lecture 25, 14 Nov 2006

Conservation Biology
ECOL 406R/506R
University of Arizona
Fall 2006

Kevin Bonine
Kathy Gerst

Conservation & Economics

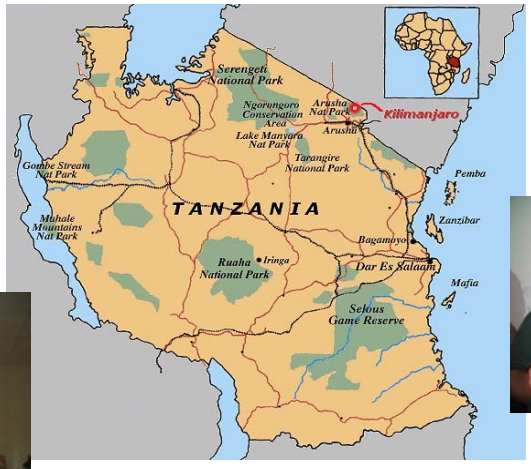
Lab this week:

none, meet 1230 s-side BSE 328 on 17 Nov

(see website for lab readings)

1

Dan and Lane will speak for 10 minutes …



Deforestation in Tanzania

2

Housekeeping, 14 November 2006

Short oral presentations :
14 Nov - Dan and Lane
28 Nov - Amanda and Fred

Upcoming Readings

Today: Economics and Sustainable Development

Thurs 16 Nov: Mike Rosenzweig, Win-Win Ecology
Tues 21 Nov: Conservation Biology Professional Panel
Thurs 23 Nov: Thanksgiving

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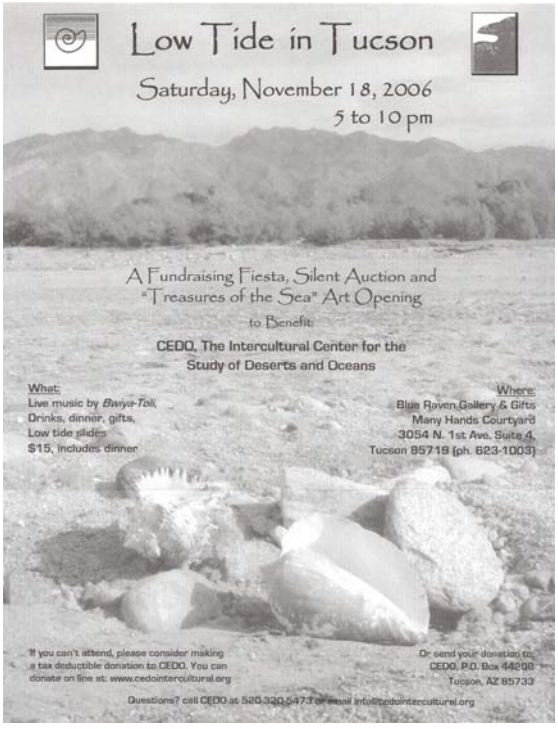

5

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.

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

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

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

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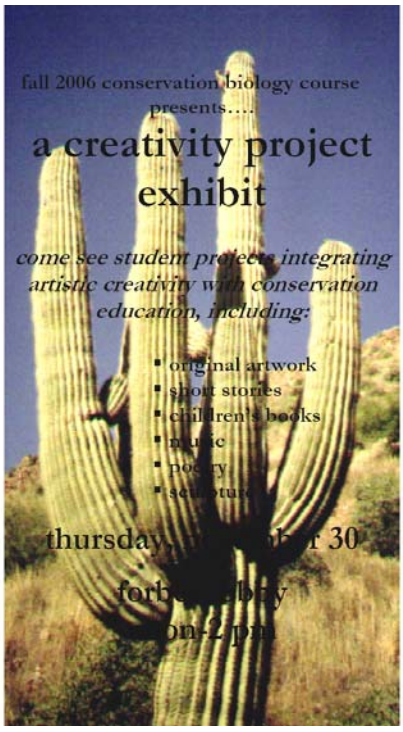

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Pooches' poo to help power Frisco

Arizona Daily Star
Published: 02.22.2006
Pooches' poo to help power Frisco
THE ASSOCIATED PRESS

SAN FRANCISCO — City officials are hoping to harness the power of dog doo-doo.
San Franciscans already recycle two-thirds of their garbage, but in this dog-friendly town, **animal feces make up nearly 4 percent of residential waste, or 6,500 tons a year — nearly as much as disposable diapers**, according to the city.
Within the next few months, Norcal Waste, a garbage hauling company that collects San Francisco's trash, will begin a pilot program under which it will use biodegradable bags and dog-waste carts to pick up droppings at a popular dog park.
The droppings will be tossed into a contraption called a **methane digester, which is basically a tank in which bacteria feed on feces for weeks to create methane gas.**
The methane could then be piped directly to a gas stove, heater, turbine or anything else powered by natural gas. It also could be used to generate electricity.
Methane digesters are nothing new. The technology was introduced in Europe about 20 years ago, and more than 600 farm-based digesters are in operation there. Nine are in use on California dairy farms, and chicken and hog farms elsewhere in the United States also use them.
Neither Norcal Waste spokesman Robert Reed nor Will Brinton, a Maine-based recycling and composting consultant, knew of anyone in the United States who is using the $1 million devices to convert pet waste to energy. But Brinton said some European countries process dog droppings along with food and yard waste.
"The main impediment is probably getting communities around the country the courage to collect it, to give value to something we'd rather not talk about," Brinton said. "San Francisco is probably the king of pet cities. This could be very important to them."
San Francisco — the city named after St. Francis, patron saint of animals — has an estimated population of 240,000 dogs and cats.

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Economics of Conservation Van Dyke Ch 12

1. Economics, Sustainability
   -Herman Daly
   -Wendell Berry

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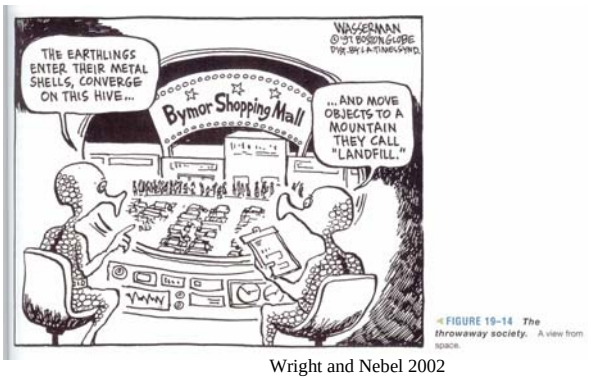


FIGURE 19–14 *The throwaway society.* A view from space.

Wright and Nebel 2002

-Population
-Consumption
-Economies
   Assumptions and Goals
-Externalities
-Genuine Progress Indicator

9

What is the purpose of the economic system?

-to what end all of this wealth? Ultimate value beyond market?

1-NeoClassical Economics (growth always good)

2-Environmental Economics (catch-all term, think cyclically)

3-Steady-State Economics (John Stuart Mill 1700's, Herman E. Daly)

- in = out
- 'Virtue and character higher goals than material wealth.'

4-Sustainable Development (Lester Brown)

- do away with many subsidies
- replace income tax with environmental tax

Stocks and Flows, → Entropy

Nicolas Georges-Roegen

~"a Cadillac now means fewer human lives later"

Utility vs. Throughput

10

(Miller 2003)

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

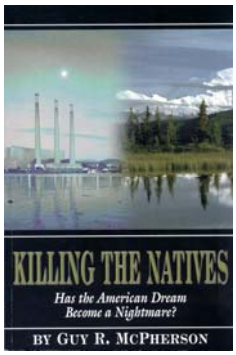
to make goods and services

Infinite Substitution?

11

Killing the Natives, Chapter 3

U.S.: 4% global population
25% fossil fuels
>25% cars
50% advertising spending



Goods vs. Bads

$80 billion on shoes, jewelry, watches
$65 billion on higher education

Americans since 1950 have consumed more than all in history preceding

indivs/house dropping in US

Jimmy Carter – malaise speech, reduce consumption...Reagan

12

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

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Economic Growth…

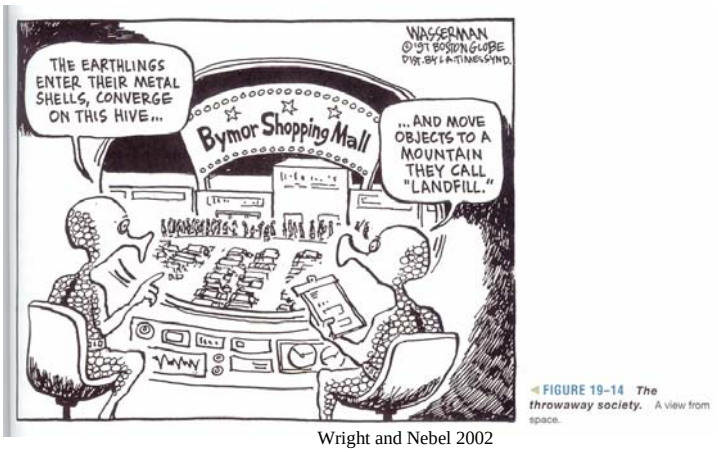

FIGURE 19–14 *The throwaway society.* A view from space.

Wright and Nebel 2002

How is Economic Development Different?

14

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.

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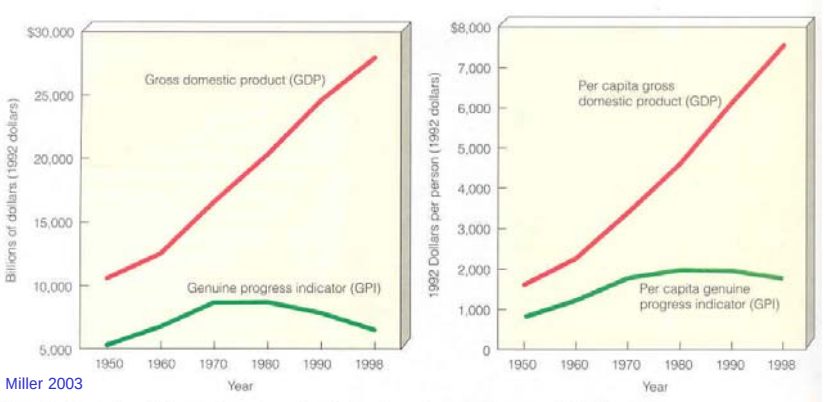


Miller 2003

Figure 2-5 Comparison of the gross domestic product (GDP) and genuine progress indicator (GPI, left) and 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 Wackernagel)

Genuine Progress Indicator

Index of Sustainable Economic Welfare

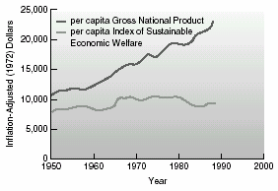
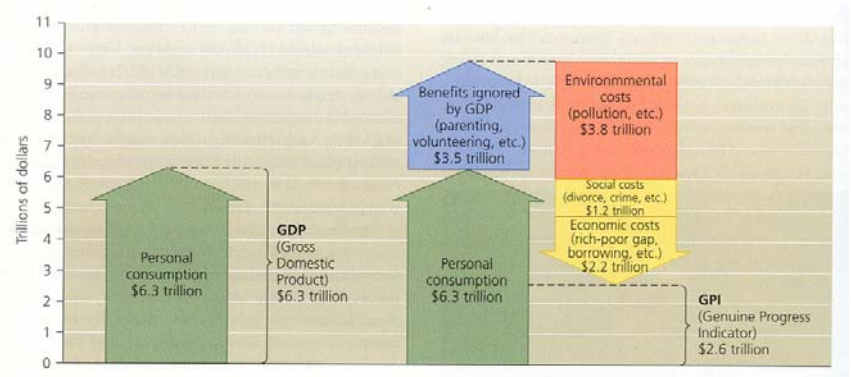


Figure 12.11 VanDyke, 2003

Changes in the U.S. Gross National Product (GNP) and Index of Sustainable Economic Welfare (ISEW) since 1950. Although the GNP has increased, the ISEW has failed to grow.



Gross domestic product (GDP) sums together all economic activity, whether good or bad. It does not account for benefits such as volunteerism or for external costs such as environmental degradation and social upheaval. The genuine progress indicator (GPI) does account for these factors and, as a result, can often be quite different in value from the GDP. Shown here are values for GDP and GPI for the United States in the year 2000. Data from Clifford Cobb, Mark Glickman, and Craig Cheslog, *The Genuine Progress Indicator 2000 Update*, Redefining Progress Issue Brief, 2001.

Brennan and Withgott 2005

Figure 2.13 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

18

"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)

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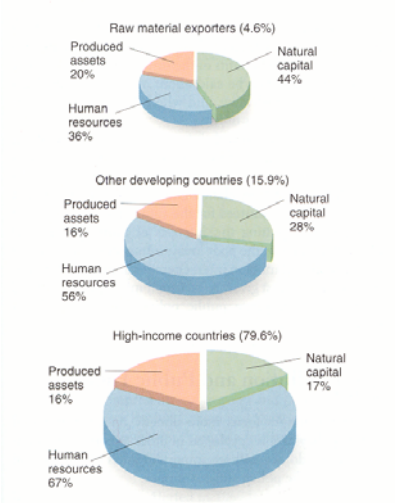

▲ FIGURE 23–5 ***Composition of world wealth.*** Some developing countries are dependent on exporting raw materials. These countries account for 4.6% of the world's wealth. The remaining developing countries contain 15.9% of the world's wealth. The high-income developed countries possess 79.6% of the wealth. Relative percentages of produced assets, natural capital, and human resources are shown for each category. (*Source*: The World Bank, *Monitoring Environmental Progress: A Report on Work in Progress* [Washington, DC: The International Bank for Reconstruction and Development, 1995], p. 63.)

Value added

Wright and Nebel 2002

20

I = P A T

(Paul Ehrlich)

Developed Countries

1.2 billion people (~19%)
high average per capita purchasing power
have 85% world's wealth
use 88% natural resources
generate 75% waste and pollution

(impact of each unit of consumption)

Environmental Impact = Population x Affluence X Technology

(of a society)

(consumption per person)

Developing Countries

81% of the people
have 15% world's wealth
use 12% world's natural resources
produce 25% waste and pollution

Poor parents in a developing country need to have 70-200 children to equal the impact of 2 U.S. children

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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.

http://www.pennenvironment.org/PE.asp?id2=17700

22

(VanDyke p. 356:)
NEPA, ESA, Clean Air, Clean Water...

-Work b/c require full and open disclosure of process and those involved.

-How do Cheney secret meetings with industry leaders to plan energy policy fit in?

SDCP and findings from economic analyses...

23

C: ~$436 billion

B: >$6.8 trillion

1:16 -> C:B

Wright and Nebel 2002

EARTH WATCH

THE CLEAN AIR ACT BRINGS A WINDFALL

The Clean Air Act (1970, 1977, and 1990) has been the subject of open political warfare between those who think its cost has been too high for industry, taxpayers, labor, and consumers and those who think the health and environmental benefits were justified. Compliance has affected patterns of industrial production, employment, and capital investment. Although these expenditures must be viewed as investments that have generated benefits and opportunities, the dislocation in some industries was severe and included reductions in high-sulfur coal mining and cutbacks in polluting industries such as steel. A need developed for a real cost–benefit analysis.

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

- The total direct cost of implementing the Clean Air Act for all federal, state, and local rules from 1970 to 1990 was $436 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.
- The mean estimate of direct benefits from the Clean Air Act from 1970 to 1990 was $6.8 trillion.
- Therefore, the net benefit of the Clean Air Act has been $6.4 trillion!

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

The benefits to society, directly and indirectly, have been widespread across the entire population. The clean Air Act has

- reduced air pollution (described in this chapter).
- improved human health: Each year, 79,000 lives were saved, and there were 18,000 fewer heart attacks, 10,000 fewer strokes, 13,000 fewer cases of hypertension, 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.
- lowered 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 more productive, less dependent life.
- lowered cancer rates.
- resulted in less acid deposition.

The EPA study result should encourage us in our hopes for a more sustainable future. Society knew what to do, took action despite disruptive efforts by special-interest and political partisans, and reaped about $16 in benefits for every $1 invested to control air pollution.

In 1999, the EPA published a second analysis of costs and benefits that looked at the impacts of the CAAA of 1990 and extended expected costs and benefits to 2010. The findings are consistent with the EPA's previous analysis. According to the later analysis, the new regulations will cost an estimated $27 billion, but will generate health and ecological benefits of about $110 billion. Estimates indicate that the amendments will prevent 23,000 Americans from an early death, more than 1.7 million asthma episodes, 67,000 incidences of acute and chronic bronchitis, and 22,000 respiratory-related hospital visits. Many of the benefits, such as those to crops and ecosystems, are difficult to put in dollar terms. Thus, the benefits exceed the costs by a margin of four to one or better; this still sounds like a good bargain!

(Source: Adapted from R. Christopherson, Geosystems, *an Introduction to Physical Geography*, 3rd ed. Copyright © 1997 by the author. Reprinted by permission of Pearson Education Inc. Upper Saddle River, NJ 07458.)