

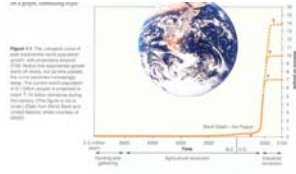
14 January 2009
1st class meeting

- Introduction
- Course Overview and Objectives
- Syllabus

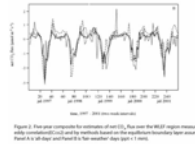
LABS BEGIN TUESDAY

Please read: Withgott & Brennan [2007hardcopy] Chapter 1
(available as PDF on course website)

Environmental Biology (ECOL 206)
University of Arizona, spring 2009
Kevin Bonine, Ph.D.
Tuan Cao, Graduate TA
Mary Jane Epps, Graduate TA



What is Environmental Biology?



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Broad Course Overview

1. Environmental Biology/Science (what is it?)
2. Ecology and Evolution
 - Energy
 - Nutrients
 - Interactions among species and the abiotic environment
 - Adaptation
 - Processes
3. Human Influence
 - Society/Culture
 - Affluence
 - Population
 - Roles



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Overall course objectives

- Grasp **scientific material** (content & literacy)
- Provide **real-world relevancy** and applications
- Place in **context** of students' lives
- Foster life-long **appreciation** and respect for:
 - field, findings, ecosystem services, biodiversity, etc.

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Where and when was this photo taken?

Habitat Modification
= leading cause of species/population declines



Santa Cruz River at A-Mountain, Tucson, early 1900s

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ATHABASCA GLACIER, Jasper National Park, Alberta, Canada, 1917 and 2005



GRINNELL GLACIER, Glacier National Park, Montana, 1911 and 2000

Global Climate Change

Sierra Magazine
Jan/Feb 2006

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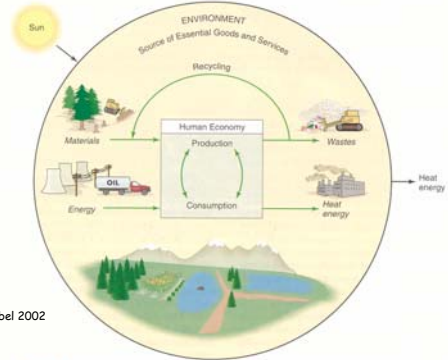
Magazine Ad
Men's Journal
Jan 2006

IS GLOBAL WARMING MAKING HURRICANES WORSE?

Global warming and the rise in hurricane strikes. Is it science tells us that global warming is making us our storms. The science says that hurricanes are getting stronger and that global warming is making them worse. So how do we get a better idea of what's going on? Let's look at the science behind the storm at sea and see how we can better understand the science behind the storm at sea.



Human Economy depends on Healthy Environment



Wright and Nebel 2002

FIGURE 23-3 Environmental economic view of economic activity. The natural environment encompasses the economy, which is constrained by the resources found within the environment.

Natural Capital and Natural Resources:

-everything flowing in natural economy and human economy



Miller 2003

Figure 14 Energy from the sun (solar capital) and natural resources (natural capital) support and sustain all of the economies on the earth.

"Life Support System"



Miller 2005

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

*Ecosystem "goods" included 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

Syllabus



-No Required Text
(Ishmael on Reserve in Science Library)

-Please get a small notebook for lab/field

-Many PDF files
-Website (<http://eebweb.arizona.edu/>)
(http://eebweb.arizona.edu/eeb_course_websites.htm)
then search for ECOL 206

-Schedules and Reading Assignments to be updated on course website

Syllabus (con't)

Course Work Details

- Exams, Cumulative Final
- Attendance, Participation, and Quizzes
- Current Environmental Events Journal (due Fridays)
- Creativity Project, Debate
- Field Trips and Lab (take notes)
- Lab Assignments, Quizzes, Attendance



Extra Credit (15 points; you can do this once) for environmentally themed songs. Sign up with your TA in your lab section to present at the beginning of lecture for 5 minutes. You should have the song playing on the computer when the 9am bell rings. Projected on the screen should be the lyrics. Give a brief biography of the artist, explain the lyrics (defining any unclear or important terms) and any specific environmental references, and explain the social context of the time during which the song was written and first performed. Are the environmental issues discussed in the song still relevant/important today? If you have trouble finding an appropriate song your instructors have some suggestions. If you are not prepared to present at the beginning of lecture on the day you signed up then you will lose 15 points from your overall grade.

Tom Lehrer (b. 1928)
"Pollution"
Post WWII Satirist

"As an undergraduate student at Harvard University, studying mathematics, he began to write comic songs to entertain his friends"

Lehrer has commented that he doubts his songs had any real effect on those not already critical of the establishment: "I don't think this kind of thing has an impact on the unconverted, frankly. It's not even preaching to the converted; it's titillating the converted... I'm fond of quoting Peter Cook, who talked about the satirical Berlin cabarets of the '30s, which did so much to stop the rise of Hitler and prevent the Second World War."

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http://www.youtube.com/watch?v=JPrAuF2f_oI

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Time was when an American about to go abroad would be warned by his friends or the guidebooks not to drink the water. But times have changed and now a foreigner coming to this country might be told the following advice.

If you visit American city,
 You will find it very pretty.
 Just two things of which you must beware:
 Don't drink the water and don't breathe the air.
 Pollution, pollution,
 They got smog and sewage and mud.
 Turn on your tap and get hot and cold running crud.
 See the halibuts and the sturgeons
 Being wiped out by detergents.
 Fish gotta swim and birds gotta fly,
 But they don't last long if they try.
 Pollution, pollution,
 You can use the latest toothpaste,
 And then rinse your mouth with industrial waste.
 Just go out for a breath of air,
 And you'll be ready for medicare.
 The city streets are really quite a thrill,
 If the hoods don't get you, the monoxide will.
 Pollution, pollution,
 Wear a gas mask and a veil,
 Then you can breathe, long as you don't inhale.
 Lots of things there that you can drink,
 But stay away from the kitchen sink.
 The breakfast garbage that you throw in to the bay,
 They drink at lunch in San Jose.
 So go to the city, see the crazy people there.
 Like lambs to the slaughter,
 They're drinking the water
 And breathing <cough> the air.

Tom Lehrer
 "Pollution"



http://www.lyricsfreak.com/t/tom+lehrer/pollution_20138396.html 30

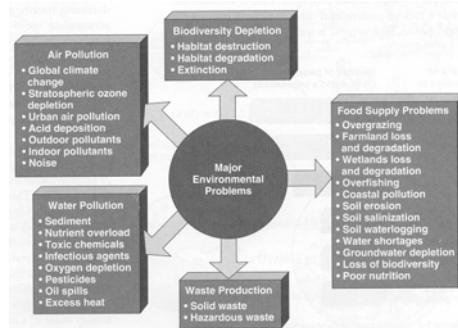


Figure 1-7 Natural capital degradation: major environmental and resource problems.

Miller 2005

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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

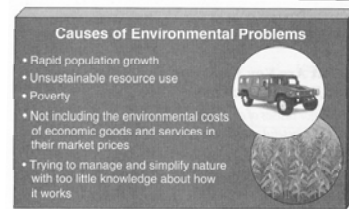
Environmental Impact = Population x Affluence x Technology
 (of a society) (consumption)

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 environmental impact of 2 U.S. children

I P A T



Miller 2005

Figure 1-8 Environmentalists have identified five basic causes of the environmental problems we face.

What would Jesus drive?

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