1. If not in lecture Tuesday, please see us after class.

Upcoming Readings

today: Textbook, chapter 1; Noss 1999
Tues 28 Aug: Textbook chapter 3; Callicott 1997 (from Meffe and Carroll)
Thurs 30 Aug: Textbook Ch. 3, Leopold readings
[Q1 due 30 Aug if you choose to answer.]
Public Water Lecture with Peter Gleick

Fresh water availability is a growing issue of concern across the world, but no more so than in arid lands. Tucson is no exception.

Will projections of our water supply in the distant future - even in the next decade or two - be accurate? How will prolonged drought affect both water quantity and quality? What impacts will water supply have on the region's economic viability?

Sustainable Tucson is co-host of a public lecture by international water expert, Peter Gleick, along with the Water Resources Research Center (WRRC) and Institute for the Study of Planet Earth (ISPE) at the University of Arizona, and the Southern Arizona Leadership Council (SALC).

A MacArthur Fellow and widely published in leading scientific journals, Dr. Peter Gleick is one of the world's top experts on the impacts of climate change on water supply. His work with communities and governments across the Southwest and the world brings a broad perspective to the local discussion.

How can we define sustainable water policies, based on sound laws and science? To what extent will water transfers and markets - the economics of shifting water - help us reconcile growth and supplies which are limited, keeping in mind that global warming, as well as land-use changes, will likely affect both surface and groundwater systems?

Sustainable Tucson believes Dr. Gleick's vision can help inform local planning by bringing the experience of many communities to bear on Tucson's creative solutions to long-term water security.

Dr. Gleick will address water experts and other leaders at the Arizona Hydrologic Society's regional conference, "Sustainable Water, Unlimited Growth, and Quality of Life: Can We Have It All?" to be held August 27 – 30 in Tucson.

The joint planning of this public lecture amongst university departments, civic, business, and community groups, points to exciting new dialogue over water and sustainability taking place in our community.

The lecture will take place in Tucson on August 30, at 7:30 p.m. at Temple Emanu-El - 225 N. Country Club Rd.

Contact Madeline Kiser (mkiser@dakotacom.net) or Susan Williams (susanleewilliams@cox.net) for more information.

http://www.sustainabetucson.org/

http://www.ecoalition.org/index.html

Think Globally, Act Locally
Quiz:

What were two of the four questions that the Noss (1999) paper attempts to address?

Distinguish between Conservation and Preservation (as defined in the Noss paper).

from what it means today. Conservation, in America at least, was strictly utilitarian and was opposed to “preservation,” which meant protecting the wonders of nature, mostly for the spiritual and aesthetic enrichment of mankind (Fox 1981). Preservation today is interpreted as a hands-off approach, one option in a

What is Conservation Biology?

When and what were the origins of the discipline?
Van Dyke Chapter 1 (p. 4)

**Ethical and Conceptual Roots**

1. **Intrinsic Value**  
   (revisit in Ch.3)

2. **Ecosystem services**

3. **Aesthetic, spiritual enrichment**

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Table 2.1 Ecosystem Services and Functions

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*Ecosystem "goods" included as ecosystem services.

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

Brennan and Withgott 2005
Van Dyke Chapter 1 (p. 5)

“Genuine and enduring conservation can occur only when humans knowingly use resources at less than maximum sustainable rates or forgo the use of some resources altogether.” [RESTRAINT]

- Philosophy (e.g., Plato)
- Religion (e.g., Judaism)
- Nobility and their Forests

Modern Con Bio starts in Colter’s Hell...

John Colter 1807 (~Lewis and Clark)
Yellowstone Area
Romantic-Transcendentalist Ethic vs. Resource Conservation Ethic

Preservation vs. Conservation

~Romantic-Transcendentalist Ethic:

Ralph Waldo Emerson
Henry David Thoreau
John Muir
   - Sierra Club 1892
   - NGO
   - Education, Lobby, Law/Politics

Yellowstone National Park 1872
Yosemite National Park 1890

ESA 1917 --> Nature Conservancy 1950
A Successful life

"To laugh often and much; to win the respect of intelligent people and the affection of children; to earn the appreciation of honest critics and endure the betrayal of false friends; to appreciate beauty; to find the best in others; to leave the world a bit better, whether by a healthy child, a garden patch, or a redeemed social condition; to know even one life has breathed easier because you have lived."

- Ralph Waldo Emerson -

“Many go fishing all their lives without knowing that it is not fish they are after.”

“Beware of all enterprises that require new clothes.”

“It is not worthwhile to go around the world to count the cats in Zanzibar.”

“Wherever a man goes, men will pursue him and paw him with their dirty institutions, and, if they can, constrain him to belong to their desperate oddfellow society.”
"poetico-trampo-geologist-botanist and ornithologist-naturalist etc. etc. !!!!!!"

John Muir
(1838-1914)

Teddy Roosevelt
(president 1901-1909)

~resource conservation ethic:

Figure 1.3  VanDyke 2003
Theodore Roosevelt, the twenty-sixth president of the United States (1901–1909), greatly supported the role of the federal government in conservation.
“To Roosevelt, it was clear that a handful of individuals and their companies were reaping most of the profits from natural resources that rightfully belonged to all citizens.” Van Dyke 2003, p. 10

early 1900s “Trustbuster”

Resources for use, but forever.

National Wildlife Refuge System (52 designations by TR)
Sustainable Use
Maximum Sustained Yield

USE those resources!

Modern Conservation Biology
- National Parks
- U.S.

Transferable?
Aldo Leopold

*Game Management* 1932

*A Sand County Almanac* (1966)
- evolution/ecology land ethic

Land Health and the A-B Cleavage

Commodities (A)
vs. Processes (B)

Rachel Carson

*Silent Spring* 1962

- Bioaccumulation
- Levels and scale
- Environmental degradation threaten *human health*

- Increased Public Awareness
With spiderly arms and big round eyes, one set of pictures shows the sorts of stick figures drawn by young children everywhere. Next to them is another group of drawings, mostly disconnected squiggles and lines, resembling nothing. Both sets of pictures are intended to depict people. The main difference identified between the two groups of young artists: long-term pesticide exposure.

Children’s drawings are not a typical tool of scholarship, but Elisabeth Guilleme, an anthropologist, wanted to use new methods. Guilleme was interested in the effects of pesticides on children, so she decided to use drawings to measure children’s development based on techniques from anthropology and psychology. Searching for a study site, Guilleme found the Yaqui Valley in the northwestern Mexico.

The Yaqui Valley is farming country, worked for generations by the indigenous group that gave the region its name. Synthetic pesticides arrived in the area in the 1940s. Soon, Yaqui farmers adopted the agricultural innovations, spraying their farms with the same chemicals to assure their yields. Yaquis farmers in the surrounding foothills, however, generally chose to bypass the chemicals and continue following more traditional farming techniques. Although differing in farming techniques, Yaquis in the valley and foothills continued to show the same cultural, diet, education, science, income levels, and family structure.

At the time of the study, in 1994, Yaqui farmers planted crops twice a year, applying pesticides up to 15 times from planting to harvest. A previous study conducted in the valley in 1990 showed a high degree of multiple pesticide exposure.

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Brennan and Withgott 2005
Journal of Wildlife Management (1937)  
Wildlife Society Bulletin  
vs.  
Conservation Biology  
Biological Conservation  

(~movement from individual game species to large scale and generalized approaches)

1985

the founding of the Society for Conservation Biology (SCB), with the explicit mission “to help develop the scientific and technical means for the protection, maintenance, and restoration of life on this planet – its species, its ecological and evolutionary processes, and its particular and total environment.”

(from Noss 1999)
Is conservation biology a distinct discipline?
- Biodiversity (levels and scales)
- Prevent degradation and loss

1. Scarcity and Abundance

2. Value laden and mission driven

3. Diversity and complexity good
   *Untimely* extinction bad

4. Evolution is good (genotypic variation)
   - process

5. Biotic diversity has *intrinsic* value
   
   (~Soulé’s normative postulates)
   
   (see 8 traits in Van Dyke Ch1, p. 15)

6. Crisis Discipline?
“In crisis disciplines, one must act before knowing all the facts; crisis disciplines are thus a mixture of science and art, and their pursuit requires intuition as well as information” (Soulé 1985).

-Noss 1999

Problems Addressed by Conservation Biologists:

1 Genetic Diversity
   variation, inbreeding, drift, hybridization

2 Species
   MVP, PVA
   small populations
   declining populations
   metapopulations

3 Habitat
   loss, fragmentation, isolation, heterogeneity

4 Ecosystem Processes
   scale

5 Human sustainability
   the crux
systems. Nevertheless, conservation biologists increasingly recognize that the proximate and ultimate threats to biodiversity virtually all have to do with humans.

Noss 1999, p. 118
In 1948 G. Evelyn Hutchinson warned of the dangers of the expanding human population and the disruption of geochemical cycles, one outcome of which could be global warming.

(from Noss 1999)

For Today, please calculate your ecological footprint TWICE:

Once for your life here in the U.S.
A second time using the same information, but choose a different country.

http://www.earthday.net/footprint/index.asp

Frequently Asked Questions re: Ecological Footprint:
http://www.rprogress.org/ecological_footprint/footprint_FAQs.htm

*Bring the Numbers to Class on Thursday. Convert to Acres.*
The big choices seem to matter the most:
- transportation
- food (unprocessed, local, trophic level)
- housing
- reproduction

Recycling etc. important, but not as big an impact

Paper or Plastic? - Bring your own.
Kevin Bonine  
Peru  
23 August 2007

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>GLOBAL HECTARES</th>
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<tbody>
<tr>
<td>FOOD</td>
<td>0.5</td>
</tr>
<tr>
<td>MOBILITY</td>
<td>0.7</td>
</tr>
<tr>
<td>SHELTER</td>
<td>0.6</td>
</tr>
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<td>0.7</td>
</tr>
<tr>
<td><strong>TOTAL FOOTPRINT</strong></td>
<td><strong>2.8</strong></td>
</tr>
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2.8 x 2.47 = 6.9 acres

In comparison, the average ecological footprint in your country is 1.2 global hectares per person.

Worldwide, there exist 1.8 biologically productive global hectares per person.

If everyone lived like you, we would need 1.6 planets.

Infrastructure and Lifestyle

Ecological Footprint

- Reproduction
- Housing
- Travel
- Food
- Etc.
Developed Countries
1.2 billion people (~19%)
have 85% world's wealth
use 88% natural resources
generate 75% waste and pollution

I = P A T

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

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

One of Commoner's lasting legacies is his four laws of ecology, as written in *The Closing Circle* in 1971. The four laws are:

1. Everything is Connected to Everything Else. There is one ecosphere for all living organisms and what affects one, affects all.

2. Everything Must Go Somewhere. There is no "waste" in nature and there is no “away” to which things can be thrown.

3. Nature Knows Best. Humankind has fashioned technology to improve upon nature, but such change in a natural system is, says Commoner, “likely to be detrimental to that system.”

4. There Is No Such Thing as a Free Lunch. In nature, both sides of the equation must balance, for every gain there is a cost, and all debts are eventually paid.
Theoretical Basis of Conservation Biology?

Figure 1.8
Diagrammatic representation of an arrangement of local populations (metapopulation) based on Andewartha and Birch (1954). Empty circles represent favorable habitats that individuals do not occupy. Partially or completely filled circles represent favorable habitats and relative densities of individuals in them as a proportion of the habitat's maximum capacity. Crosses indicate habitats in which local populations recently became extinct.

Van Dyke 2003

Figure 1.9
Three variations of the metapopulation concept. Although different in detail, all represent metapopulations as spatially distinct groups (subpopulations) that disperse to or among physically separated habitats.

Van Dyke 2003

- Metapopulations
- Island Biogeography
  - MacArthur and Wilson 1963
- Testable Hypotheses
- Thresholds
Noss 1999
Is there a special conservation biology?

**Origins**
Soulé et al. 1978+
SCB 1986
*Conservation Biology* 1987

**Ideas**
- Precautionary Principle
- Value Laden
- Species differences...
- Umbrella species
- Advocacy

Pattern and Generality vs. Special Case

p. 116, Noss 1999
Responsible Advocacy?

Ethical Advocacy?
   p.117, Noss 1999:
   tropical rainforest
   vs.
   economic development program

Is ConBio distinct discipline?