

## We need stuff

### Human Appropriation of the Products of Photosynthesis

1986  
*Nearly 40% of potential terrestrial net primary productivity is used directly, co-opted, or foregone because of human activities*

Peter M. Vitousek, Paul R. Ehrlich, Anne H. Ehrlich, and Pamela A. Matson

### Human Appropriation of Photosynthesis Products

2001  
 Stuart Rojstaczer, Shannon M. Sterling, Nathan J. Moore

*Previous global estimates of the human impact on terrestrial photosynthesis products depended heavily on extrapolation from plot-scale measurements. Here, we estimated this impact with the use of recent data, many of which were collected at global and continental scales. Monte Carlo techniques that incorporate known and estimated error in our parameters provided estimates of uncertainty. We estimate that humans appropriate 16 to 35% of terrestrial photosynthesis products. This broad range reflects uncertainty in key parameters and makes it difficult to ascertain whether we are approaching crisis levels in our use of the planet's resources. Improved estimates will require high-resolution global measures within agricultural lands and tropical forests.*

### Primary production required to sustain global fisheries

1995  
 D. Pauly & V. Christensen

*The shelf systems exhibit high PPR, from 24.2 to 35.9%, mainly due to industrialized fisheries operating at high trophic levels, a feature in which they differ from upwelling systems, for 8% of total*

### Human Appropriation of Renewable Fresh Water

1996  
 Sandra L. Postel, Gretchen C. Daily, Paul R. Ehrlich

*Humanity now uses 26 percent of total terrestrial evapotranspiration and 54 percent of runoff that is geographically and temporally accessible. Increased use of evapotranspi-*



## Time to reflect...

- Captain Obvious (hint = me) says:
  - So, how can you have a positive interaction with the planet?
  - Be *mindful* of:
    - 1)
    - 2)



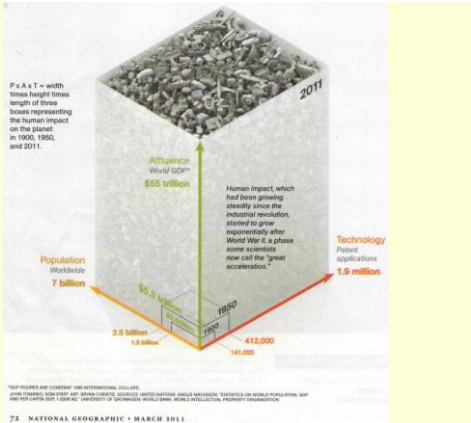
## A simple model

$$I = P \times A \times T$$

### Impact of Population Growth

Complacency concerning this component of man's predicament is unjustified and counterproductive.

Paul R. Ehrlich and John P. Holdren  
(1971; *Science*)



## One dude's view

**TED** Ideas worth spreading

Talks	TED Conferences
Speakers	TEDx Events
Playlists	TED Prize
Translations	TED Fellows

Speakers **Hans Rosling**: Global health expert; data visionary (1948 – 2017)



In Hans Rosling's hands, data sings. Global trends in health and economics come to vivid life. And the big picture of global development—with some surprisingly good news—snaps into sharp focus.

## Is green energy one solution?



## Yes, but...

### Bats Killed in Large Numbers at United States Wind Energy Facilities

MARK A. HAYES

> 600,000 in 2012

2013  
2013

Estimates of bird collision mortality at wind facilities in the contiguous United States

Scott R. Loss<sup>a,\*</sup>, Tom Will<sup>b</sup>, Peter P. Marra<sup>a</sup> 140,000 – 328,000 / year

<sup>a</sup>Migratory Bird Center, Smithsonian Conservation Biology Institute, National Zoological Park, P.O. Box 37012 MRC 5503, Washington, DC 20013, USA

<sup>b</sup>U.S. Fish and Wildlife Service, Division of Migratory Birds, Midwest Regional Office, 5600 American Blvd. West, Suite 990, Bloomington, MN 55427-1458, USA

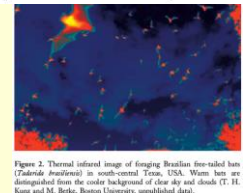
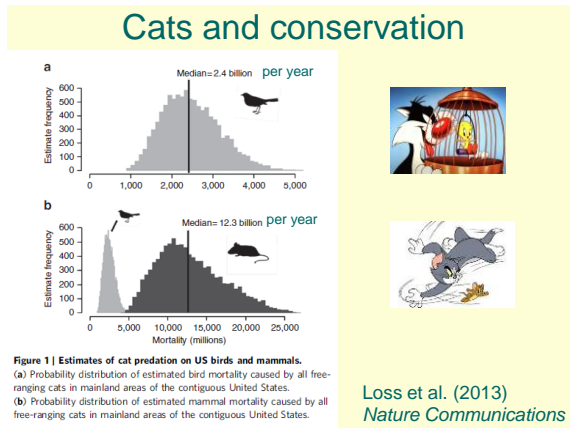
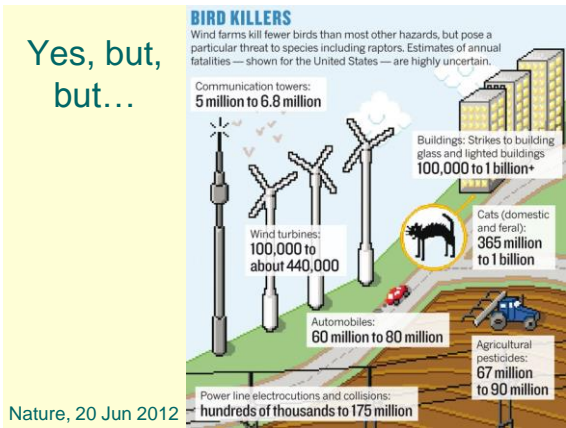


Figure 2. Thermal infrared image of foraging Brazilian free-tailed bats (*Zalotis macroura*) in south-central Texas, USA. Warm bats are distinguished from the cooler background of clear sky and clouds (T. H. Kone and M. Beck, Boston University, unpublished data).



## What is conservation ecology?

- What do you think? Key parts?

## A “crisis discipline”

### What is Conservation Biology?

- Soule (1985; *BioScience*)
  - Analogous to surgery to physiology; war to political science
  - Decisions have to be made, actions must be taken BEFORE knowing all of the relevant facts
  - Uncertainty
- Why the urgency?
  - 20% of the world’s vertebrate species that have been evaluated are labeled as at least Threatened on 2014 IUCN Red List

### “Crisis discipline” in action: The “Lord-God Bird”

Ivory-billed      Pileated

Evidence

“Rediscovered” in 2004/2005;  
 USFWS spent \$14 million, most on habitat  
<http://www.birds.cornell.edu/ivory/>

### Some guiding principles

- Evolution unites all of biology, including conservation biology, and should be a central focus
- The natural world is dynamic and largely non-equilibrial
- Humans are a part of nature and must be included

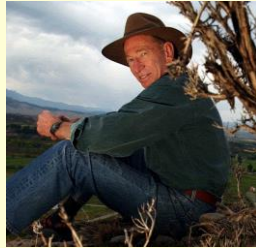
Great moments in evolution

See Table 1.1      Soule (1985)



## Ethical postulates—conservation values

- Biotic diversity is good
- Ecological complexity is good
- Evolution is good
- Biotic diversity has intrinsic value



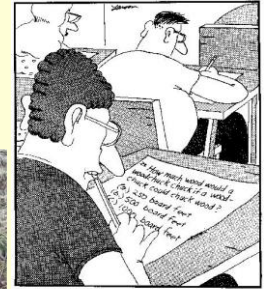
Michael Soule

Soule (1985)

## Conservation Ecology vs. Wildlife Management

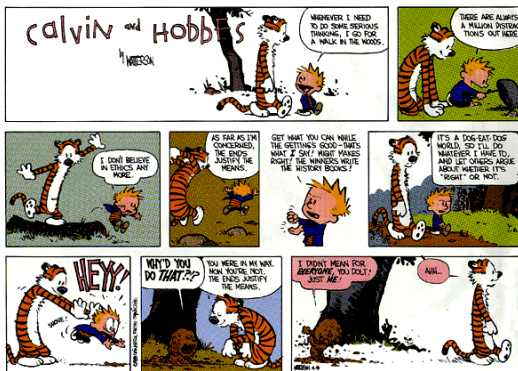
### • Historical differences

- Utilitarian vs. intrinsic value
  - The A-B cleavage (Aldo Leopold)
- Both focus on species, but...



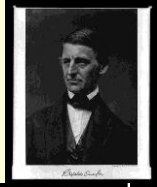
The Wildlife Management finals

## Origins of conservation ecology: 3 “ethics”



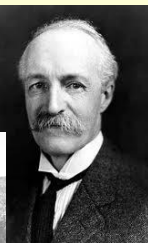
## The Romantic-Transcendentalist Ethic

- Ralph Waldo Emerson (1803 – 1882)
  - “Into the woods we return to reason and faith.”
- Henry David Thoreau (1817 – 1862)
  - “All good things are wild and free.”
  - “In wildness is the preservation of the world.”
- John Muir (1838 – 1914)
  - “The clearest way into the universe is through a forest wilderness.”
  - Yosemite (1)
  - Preservationist
  - The Sierra Club



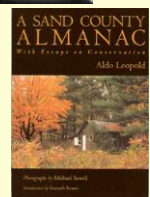
## The Resource Conservation Ethic

- Teddy Roosevelt (1858 – 1919)
- Gifford Pinchot (1865 – 1946)
  - “the greatest good for the greatest number for the longest time”



## The Evolutionary-Ecological Land Ethic

- Aldo Leopold (1887 – 1948)
  - “The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.”
  - “A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.”
  - “To keep every cog and wheel is the first precaution of intelligent tinkering.”
  - “Wilderness is the raw material out of which man has hammered the artifact called civilization.”



## Some more recent contributors

- Rachel Carson (1907 – 1964)
  - *Silent Spring* (1962)
- Paul and Anne Ehrlich
  - *The Population Bomb* (1968)
- E.O. Wilson
  - *The Diversity of Life* (1993)
- Wangari Maathai (1940 – 2011)
  - 2004 Nobel Peace Prize Winner
- 2007 Nobel Peace Prize winner?

