

Lecture 03, 30 Aug 2005

Conservation Biology
ECOL 406R/506R
University of Arizona
Fall 2005

Kevin Bonine
Kathy Gerst

1

Conservation Biology 406R/506R

1. What is Conservation Biology?
2. Wildlife Society Presentation at 1340h.

Biodiversity=

"...the immune system for life..."

(Meadows 1990)

2

Kevin,

Do you think anyone in the Cons Bio class would be interested in a little **independent study opportunity** here on Tumamoc? I need a student(s) to go out and set up a handful (~6) 20 x 20 cm plots at 2 or three locations around the Hill so that we can get an idea of what's going on with **buffelgrass seedling establishment** this year. We've just had a huge seedling emergence event, but the big question is what proportion of seedlings will actually persist. After the plots are setup, the student would need to **come out and count seedlings every two weeks or so until mid Nov (first frost)**. Let me know if you think I might be able to sell this to some of your students. I need to get started sometime in the next two weeks to catch the emergence from the last good rain we had. Thanks,
--Travis

Travis M. Bean
University of Arizona
The Desert Laboratory
1675 West Anklam Road
Tucson, AZ 85745
p: 520/629-9455 x 104
f: 520/670-6806
bean@email.arizona.edu

3

Romantic-Transcendentalist Ethic
vs.
Resource Conservation Ethic

Preservation
vs.
Conservation

4

~Romantic-Transcendentalist Ethic:

Ralph Waldo Emerson

Henry David Thoreau

John Muir

-Sierra Club 1892

-NGO

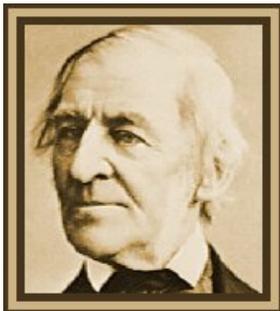
-Education, Lobby, Law/Politics

Yellowstone National Park 1872

Yosemite National Park 1890

ESA 1917 --> Nature Conservancy 1950

5



Ralph Waldo Emerson
1803-1882

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 -

6



Henry David Thoreau
(1817-1862)

“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. “

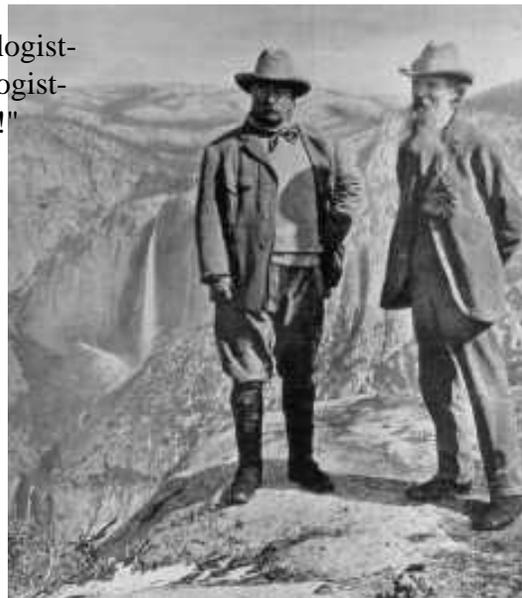
“Wherever a man goes, men will pursue him and paw him with their dirty institutions, and, if they can, constrain him to belong to their desperate oddfellow society. “

7

"poetico-trampo-geologist-
botanist and ornithologist-
naturalist etc. etc. !!!!"



John Muir
(1838-1914)



8

Teddy Roosevelt
(president 1901-1909)

~resource conservation ethic:

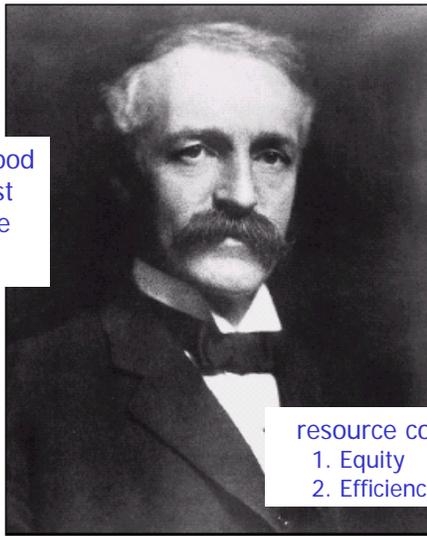


Figure 1.3 VanDyke 2003
Theodore Roosevelt, the twenty-sixth president of the United States (1901–1909), greatly supported the role of the federal government in conservation.

“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.



Gifford
Pinchot

"The greatest good
for the greatest
number for the
longest time"

resource conservation ethic:
1. Equity
2. Efficiency

Figure 1.4 VanDyke 2003
Gifford Pinchot, early head of the U.S. Forest Service and father of the resource conservation ethic. From an original staff of only 123 in 1898, Pinchot built the Forest Service to an organization of 1,500 people administering 150 million acres of public land within 10 years.

11

Sustainable Use
Maximum Sustained Yield

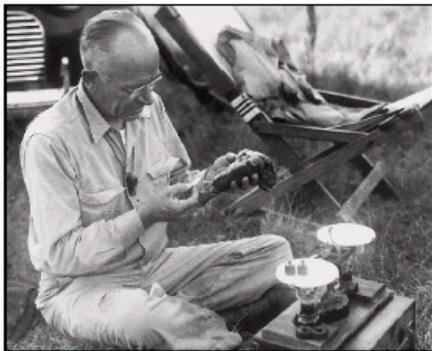
USE those resources!

12

Modern Conservation Biology
National Parks
U.S.

Transferable?

13



Aldo Leopold

Game Management 1932

A Sand County Almanac (1949)
-evolution/ecology land ethic

Figure 1.5 Van Dyke 2003
Aldo Leopold, early twentieth-century conservationist and father of
the modern land ethic.

Land Health and the A-B Cleavage

Commodities (A)
vs. Processes (B)

14

Aldo Leopold
A Sand County Almanac (1949)

“One group (A) regards the land as soil, and its functions as commodity-production; another group (B) regards the land as a biota, and its function something broader.”

Land Health and the A-B Cleavage

15

Rachel Carson
Silent Spring 1962

- Bioaccumulation
- Levels and scale
- Environmental degradation threaten human health
- Increased Public Awareness



Figure 1.6 Van Dyke 2003
Rachel Carson, U.S. Fish and Wildlife Service biologist and author of *Silent Spring* (1962), a seminal book in the modern environmental movement.

Problems Addressed by Conservation Biologists:

1 Genetic Diversity

variation, inbreeding, drift, hybridization

2 Species

MVP, PVA

small populations

declining populations

metapopulations

3 Habitat

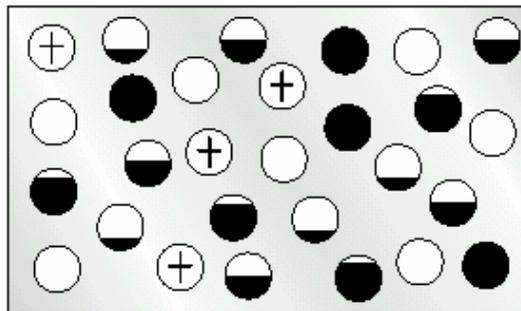
loss, fragmentation, isolation, heterogeneity

4 Ecosystem Processes

scale

5 Human sustainability

the crux



-Metapopulations

-Island Biogeography
MacArthur and
Wilson 1963

-Testable Hypotheses

-Thresholds

Figure 1.8

Diagrammatic representation of an arrangement of local populations ("metapopulation") based on Andrewartha 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.

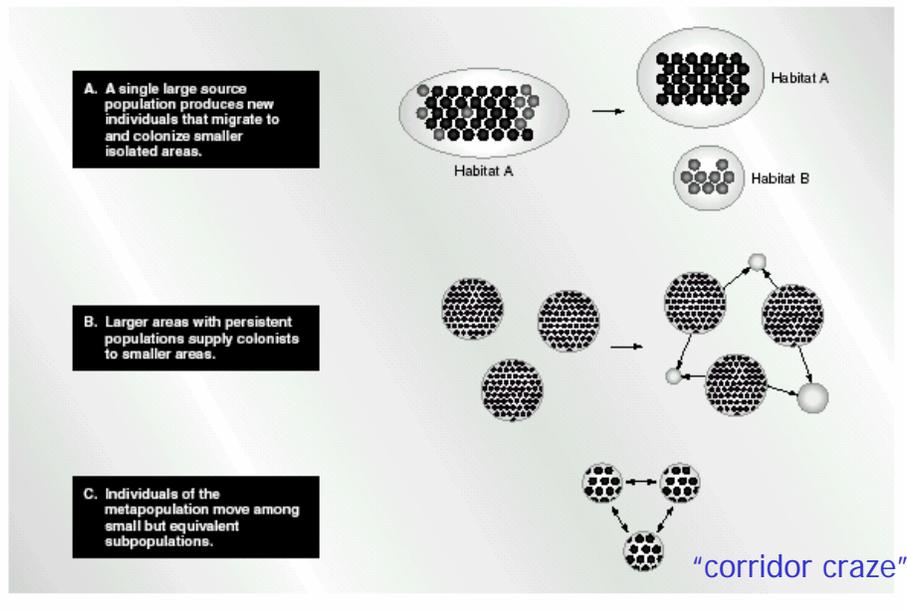


Figure 1.9 Van Dyke 2003
 Three variations of the metapopulation concept. Although different in detail, all represent metapopulations as spatially distinct groups (subpopulations) that disperse to or among physically separated habitats.

Is conservation biology a distinct discipline?

- Biodiversity (levels and scales)
- Prevent degradation and loss



1. Scarcity and Abundance

2. Value laden and mission driven

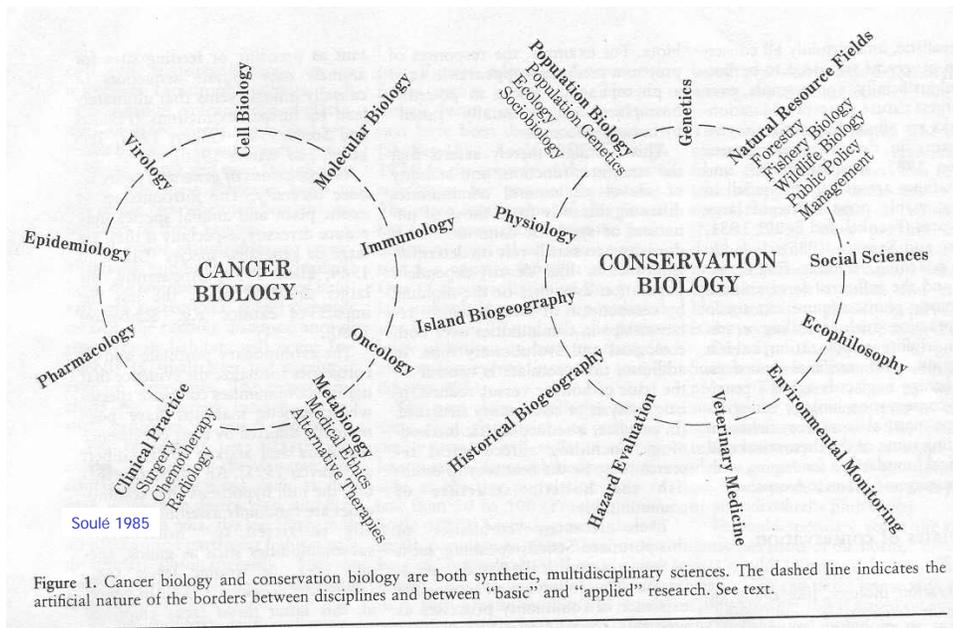
3. Diversity and complexity good
Untimely extinction bad

4. Evolution is good (genotypic variation)
 -process

5. Biotic diversity has intrinsic value



(~Soulé's normative postulates) ²⁰



6. Crisis Discipline?

21

Objectivity vs. Neutrality (Van Dyke p. 57)



22

Journal of Wildlife Management (1937)
Wildlife Society Bulletin

vs.

Conservation Biology
Biological Conservation



Figure 1.5 The first issue of the journal *Conservation Biology*, published in May 1987. (Photograph courtesy of E. P. Pister.)

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





Responsible Advocacy?

Noss 1999

Ethical Advocacy?

p.117, Noss 1999:

tropical rainforest

vs.

economic development program

Is ConBio distinct discipline?

25

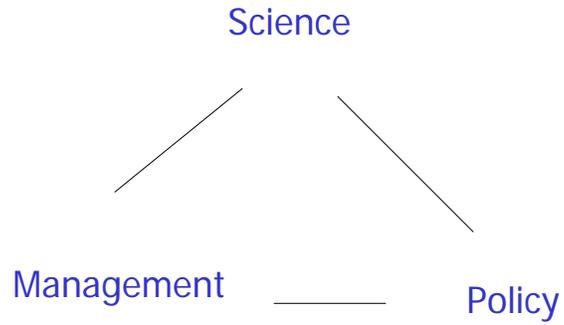
Noss 1999

Society for Conservation Biology (SCB; ~1987):

“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” (cited in Noss 1999, p. 114)

26

Noss 1999



27

Noss 1999

What does he mean by
"a special conservation biology?"

How is the **Environmental Movement** similar
to, or different than, **Conservation Biology**?

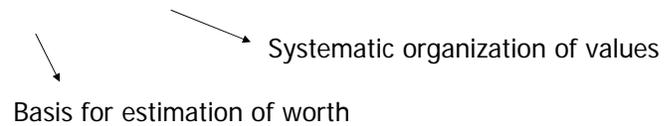
28

Van Dyke Chapter 3

Callicott (Chapter 2 in Meffe and Carroll, 1997)

29

Values, Ethics, Philosophy...



VALUE OF BIODIVERSITY

-Instrumental/utilitarian

-Intrinsic/inherent



30

Table 2.1
Four Categories of the Instrumental Value
of Biodiversity

Category	Examples
Goods	Food, fuel, fiber, medicine
Services	Pollination, recycling, nitrogen fixation, homeostatic regulation
Information	Genetic engineering, applied biology, pure science
Psycho-spiritual	Aesthetic beauty, religious awe, scientific knowledge

Callicott 1997

31

Values, Ethics, Philosophy...

Monetizing

-discount rate

-rates of growth and reproduction

Economic development short sighted?

BCA

Valuation methods

willingness to pay/ accept

travel cost

existence value

contingent valuation

bequest value



32

Madagascar Periwinkle Argument

(Callicott p. 30)

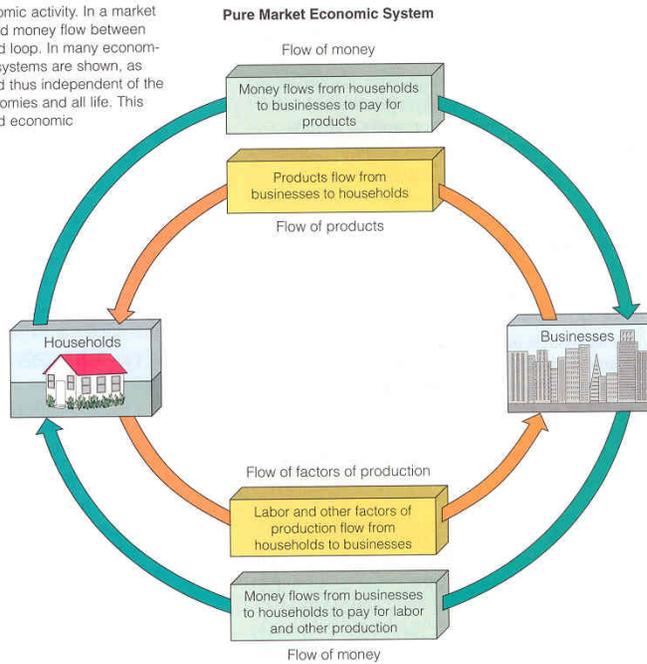


33

Figure 2-2 *Conventional view of economic activity.* In a market economic system, economic goods and money flow between households and businesses in a closed loop. In many economics textbooks, such market economic systems are shown, as here, as if they were self-contained and thus independent of the natural resources that support all economies and all life. This model reinforces the idea that unlimited economic growth of any kind is sustainable.

=14-1 Miller 2003

Conventional Economics



Ecological Economics

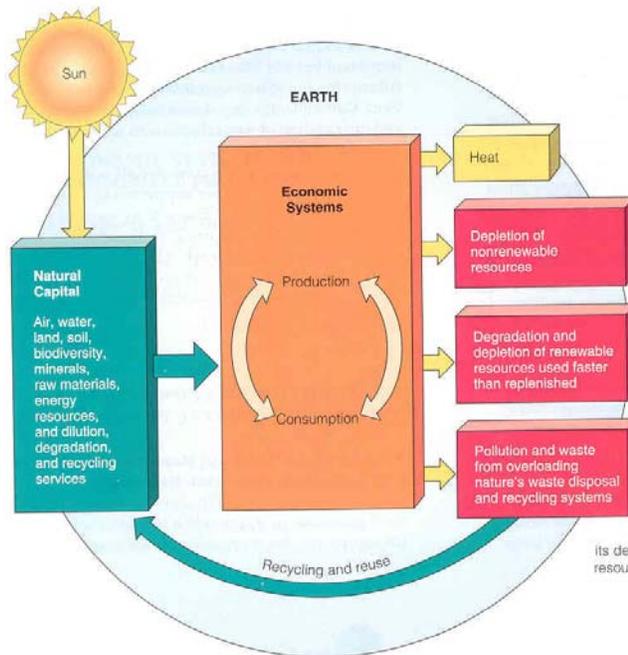


Figure 2-3 Ecological view of economic activity. Ecological economists see all economies as human subsystems that depend on resources and services provided by the sun and the earth's natural resources. A consumer society devoted to economic growth to satisfy ever-expanding wants assumes that our technological cleverness will allow us to find (1) substitutes to overcome any limits on resources and (2) ways to keep pollution and environmental degradation at acceptable levels. To ecological economists, such a society is unsustainable because of its depletion and degradation of natural resources, many of which have no substitutes.

=14-2 Miller 2003

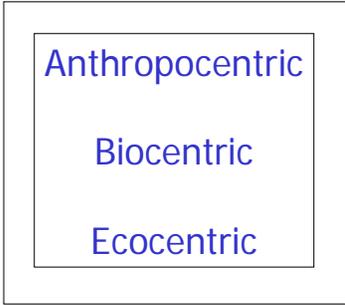
Ecological vs Conventional Economics

Characteristic	Unsustainable Economic Growth	Environmentally Sustainable Economic Development
Production emphasis	Quantity	Quality
Natural resources	Not very important	Very important
Resource productivity	Inefficient (high waste)	Efficient (low waste)
Resource throughput	High	Low
Resource type emphasized	Nonrenewable	Renewable
Resource fate	Matter discarded	Matter recycled, reused, or composted
Pollution control	Cleanup (output reduction)	Prevention (input reduction)
Guiding principles	Risk-benefit analysis	Prevention and precaution

=14-3 Miller 2003

Figure 2-4 Comparison of unsustainable economic growth and environmentally sustainable economic development.

mente
indica



37

Evolution of rights...

monarchs
 white males
 "all men"
 humanity
 sentient beings
 nature?



Eastern Kingbird
 (*Tyrannus tyrannus*)

"Bonuses?"

(Callicott p. 47)

38

Shift Burden of Proof/Responsibility (precautionary principle)

SMS (safe minimum standard)

	~Developers	~Conservationists
1 Instrumental		B of P
2 Intrinsic also	B of P	
3 BCA		B of P
4 SMS	B of P	

39

Plastic Trees
in Los Angeles?

knowledge -> advocacy?



" Perhaps our grandsons,
having never seen a wild
river, will never miss the
chance to set a canoe in
singing waters."

-Leopold

Values, Ethics, Philosophy...

Rolston Essay (p. 35 in Van Dyke text)

-species vs. species in the system
(definition of species)



-value of evolutionary trajectory

-extinction and doors
(temporal and spatial scales)



Anthropogenic perturbations:

...fast rate and large spatial scale.

(Cited in Callicott 1997)

Values, Ethics, Philosophy...

Ethics:

constrain self-serving behavior in
deference to some other good

Tragedy of the Commons

Role of religions?

interpretation...

43

Science, Vol 162, Issue 3859, 1243-1248 , 13 December 1968

The Tragedy of the Commons

Garrett Hardin

The tragedy of the commons develops in this way. Picture a **pasture** open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of **social stability** becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.

As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility *to me* of adding one more animal to my herd?" This utility has one negative and one positive component.

1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1.

2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1.

Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another. . . . But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the **tragedy**. Each man is locked into a system that compels him to increase his herd without limit--in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

Table 3.3 Seven Major Worldviews that Shape Environmental and Conservation Ethics

WORLDVIEW	TYPE OF VALUE	MOTIVATION FOR CONSERVATION
1. Judeo-Christian stewardship	Theocentric	Preserve the ecological systems that God has commanded humans to care for, as exemplified by the placing of man in the garden to "work it and take care of it"(Genesis 2: 15). Humans should respect and not destroy God's handiwork.
2. Deep ecology and related value systems	Ecocentric	The rights or intrinsic values attributed to nonhuman nature place limitations on human prerogatives to use or alter nature and must be respected.
3. Transformationalist/transcendentalism	Anthropocentric	Respect the spritual value of nature, which provides solace to consider life's deepest questions and can cure human alienation.
4. Constrained economics	Anthropocentric	Resource use is primarily a problem of human economics. Because avoiding irreversible damage to the environment is beneficial, the environment should be preserved when the economic cost is not too great. Low risk taking, common sense, and avoiding irreversible damage to the environment are justification.
5. Scientific naturalism	Science-centered/ecocentric	Scientific theories of evolution and ecology reveal necessary limits on population growth and violence to the land. Dynamism and contextualism are emphasized.
6. Ecofeminism	Anthropocentric feminism	Because man's domination over nature is symbolic of his domination over women, preserving the environment fights to cure both environmental and social problems.
7. Pluralism/pragmatism	Anthropocentric	Philosophy, although it can serve as a tool to solve moral problems, is not emphasized. Rather, practical problem solving and ethical principles are used to address environmental issues.

¹Norton, B. G. 1991. *Toward unity among environmentalists, 197-99*. New York: Oxford University Press.

45

Van Dyke 2003

Personal Example?
Virtue?
(Van Dyke p. 75)

46

1. Should conservation biologists explain the value of biodiversity in purely instrumental terms or should they also include reasons invoking intrinsic value?

47

2. How should we respond to the question of "What good is it?"

48

3. How do we know that humans, or anything, have intrinsic value?

49

4. How does this quote from Leopold sit with the idea of intrinsic value?

For one species to mourn the death of another is a new thing under the sun. The Cro-Magnon who slew the last mammoth thought only of steaks. The sportsman who shot the last pigeon thought only of his prowess. The sailor who clubbed the last auk thought of nothing at all. But we, who have lost our pigeons, mourn the loss. Had the funeral been ours, the pigeons would have hardly mourned us. In this fact . . . lies objective evidence of our superiority over beasts (Leopold 1966:117).

50