

Env 121: Conservation of Biodiversity

Lecture 2: Introduction
to Conservation
3 April 2007
Professor Victoria Sork

1

What is conservation biology?

Definition

1. The study of biodiversity
2. Study of threatened and endangered species
3. Study of ecological and evolutionary processes that underlie preservation

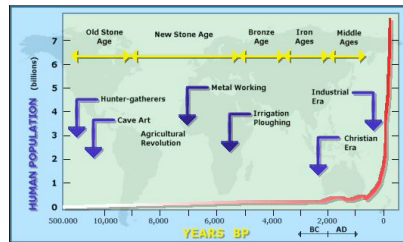
How is it studied?

1. Application of theories and concepts of basic biology.
 - Ecology, evolution, population genetics, systematics, biogeography
2. Incorporation of economics, sociology, anthropology, philosophy, public policy

4 April 2007

2

Conservation biology as a crisis discipline

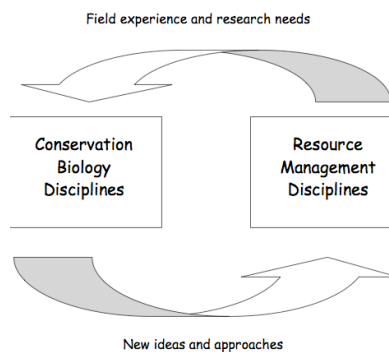


1. Population: human population growth and disturbance is threatening biodiversity
2. Affluence: Unequal use of human resources
3. Technology

4 April 2007

3

Framework & Solutions

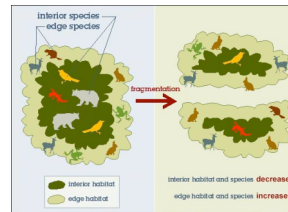
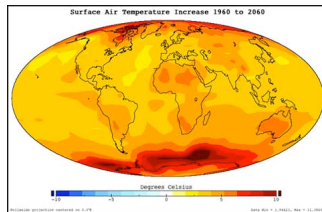


- Stewardship of natural biodiversity
- Environmental education
- Interaction of good science and good policy
- Environmentally sustainable development

4 April 2007

4

Contemporary threats to biodiversity



4 April 2007

5

Ethical Principles of Conservation

- Diversity of species and biological communities should be preserved
- Untimely extinctions of populations and species should be prevented
- Ecological complexity should be maintained
- Evolution should continue
- Biological diversity has intrinsic value

4 April 2007

6

History of conservation in the US, I

Romantic-Transcendental Conservation Ethic

- Mid 1800's: Quasi-religious
- Ralph Waldo Emerson:
Nature is a temple to
commune with spiritual world
- David Henry Thoreau:
Walden published in 1854
 - Give up materialism
- John Muir (1838-1914):
preservation ethic; spiritual
value of nature

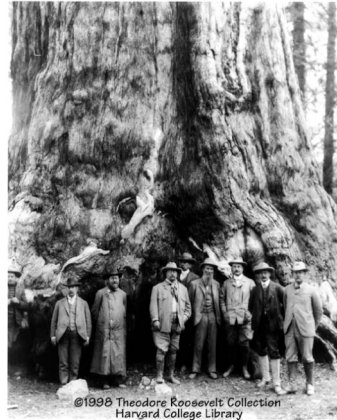


Photo: John Muir with Teddy
Roosevelt at Yosemite in 1903

4 April 2007

7

History: Resource Conservation Ethic

- “natural resource”
- “greatest good for the greatest
number for the longest time”
- Gifford Pinchot (1865-1946,
 - First head of US Forest
Service
- Precursor to today's version of
sustainable development
- Government bodies are
needed to manage and
control natural resources.



Pinchot (1865-1946)

4 April 2007

<http://www.phmc.state.pa.us/ppet/pinchot/PINCHOT1.jpg>

8

History III: Evolutionary-ecological land ethic

- Aldo Leopold: A Sand County Almanac, 1949
- Government forester turned ecologist
- Land should be based on evolutionary and ecological principles
- Land use policies should enhance biodiversity
- Precursor to “Ecosystem management”



Leopold (1887-1948)

4 April 2007

http://www.pbs.org/harriman/images/film/filmhist_leopold_lg.jpg 9

History IV: The “mothers of ecology”



www.mit-amita.org/esr/images/sampling3a.jpg

Ellen Swallow Richards (1842-1911)

- First woman to receive BA from MIT
- Chemist; taught ecology course
- Water and public health

Rachel Carson (1907-1964)

- Silent Spring (1962): role of pesticides in loss of bird populations; led to ban on DDT
- Was personally attacked; “hysterical”
- US Fish & Wildlife employee



4 April 2007

<http://192.211.16.13/curricular/MES/rachel.jpg> 10

History, IV: Modern Conservation Biology



www.heinzwards.net/upload/ehrllich.gif

Paul and Anne Ehrlich

- *The Population Bomb* (1968)
- Paul Ehrlich, one of founders of modern conservation biology

Jared Diamond, UCLA

- *Collapse* (2005): historical analysis of population growth and habitat destruction



4 April 2007

<http://dukenews.duke.edu/2006/02/images/Moutain%20Photo1.jpg> 11

Modern conservation biology

- Emerged from academic biology
- Based on theories of evolutionary biology and ecology
- Ignored traditions of forestry, wildlife management, and fisheries
- Other key people:
 - Michael Soulé: Founder of Society for Conservation Biology
 - E. O. Wilson: *The Diversity of Life* (1992)
 - Peter Raven: Director, Missouri Botanical Garden; National Geographic Society

4 April 2007

12

Value of Biodiversity: Instrumental value

- Utilitarian
- Value that something has as a means to another's ends
- Anthropocentric
- Kinds
 - Goods
 - Services
 - Information
 - Psycho-spiritual (Aldo Leopold: "refined taste as natural objects")

4 April 2007

13

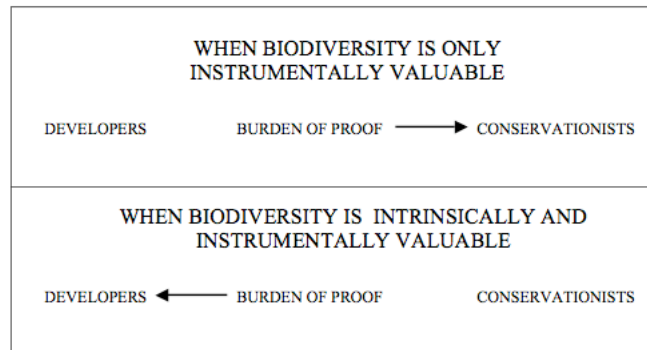
Value of Biodiversity: Intrinsic value

- Value is the value that has an end in itself
- Humans consider themselves to have intrinsic value
- Issues
 - What possesses intrinsic value?
 - Does intrinsic value exist objectively or is it subjectively conferred?
- All organisms have intrinsic value because they are self-organizing
- Do ecosystems or biodiversity have intrinsic value?

4 April 2007

14

Instrumental versus intrinsic value Norton's Convergence Hypothesis



4 April 2007

15

Monetizing the value of biodiversity

- Put a dollar value on biodiversity
- Can be based on instrumental and intrinsic value
- "Enclosing" a species: assign rights to cull it
- Numerous other ways to assign value to items
 - Direct monetary value (e.g. whales, nuts)
 - Aesthetic value
 - Service value
- Endangered Species Act of 1973:
 - political decision to remove biodiversity from market
- Amendment of Endangered Species Act, 1978
 - Development project can proceed if the economic benefits are sufficiently great

4 April 2007

16

Safe Minimum Standard Rule

- A safe minimum standard criterion preserves some minimum amount or safe standard (population) of a species unless maintaining that amount generates unacceptable social cost.
- Maintenance of the SMS of any species is good
- Maintain the SMS unless the opportunity costs are intolerably high

4 April 2007

17

Conservation Ethics

- A. Anthropocentrism
 - Nature is to serve humans
 - Consideration of effect of resource use on other humans
- B. Judeo-Christian Stewardship Conservation Ethics
 - God has put intrinsic value on every creation
 - Humans should be responsible stewards
 - Humans are accountable to God to conserve biodiversity

4 April 2007

18

Traditional non-western conservation ethics

	Islam	Hinduism	Buddhism	Taoism
Characteristic				
Source of value in nature	External (Allah)	Internal (Atman-Brahman)	Internal (Buddha-nature)	Emergent (the Tao or way)
Human attitude towards nature	Respect for creation is respect for Creator	Identification; self-realization	Loving-kindness; solidarity	Harmony; cooperation
Conservation Practice	Conserve resources for future generations	Conserve trees and other beings that manifest Atman-Brahman	Still desires; reduce consumption; contemplate nature	Adapt human economy to nature's economy

4 April 2007

19

Biocentrism and Ethics

- Early Western moral philosophers; e.g. Immanuel Kant (1785), argue
 - only humans have intrinsic value because of rationality and linguistic ability; only humans are worthy of ethical treatment
 - Animals are instrumentally valuable
- Singer (1975) argues that sentience should be criterion for ethical standing.
- Taylor's (1986) biocentrism: all living things have equal inherent worth
- Rolston's (1988) biocentrism: living things have hierarchy or worth.

4 April 2007

20

Ecocentrism and non-anthropocentrism

Aldo Leopold Land Ethic:

“A thing is right when it tends to protect the health and integrity of ecosystem and evolutionary structure and processes. It is wrong when it tends to do otherwise.”

“In short, a land ethic changes the role of Homo sapiens from the conqueror of the land community to plain member and citizen of it. It implies respect for his fellow-members and also respect for the community as such.”

--> Guiding environmental ethic for conservation biology