

Valuing Species

What is Biodiversity?

Biodiversity = the level of biological complexity; the degree to which different species are interacting with each other.

Species diversity involves two separate factors, each leading to a different index of diversity:

(1) number of species

(2) evenness of species (how equally abundant they are)

Why is Biodiversity Valuable?

- **Energy Efficiency:** Promotes efficient use of solar energy (both direct and in terms of stored energy)
- **Stability:** Increases the ability of an ecosystem to restore itself after local disasters.
- **Biological services:** pollination, carbon cycle, nutrient cycles, flood control, pest management, genetic material, medicines, etc. [Estimated at \$33 trillion/year]

What is a Species?

Four Concepts:

Folk: species are discontinuous groups of “reproductively compatible” organisms.

Biological: species are “reproductively isolated communities” (*geographical, temporal, ecological*).

Morphological: species are “the smallest groups consistently and persistently distinct and distinguishable by ordinary means” (i.e., examined in the field).

Phylogenetic: species are historically related organisms.

[Ernst Mayr, *One Long Argument* (Harvard 1991)]

How Many Species are There?

Number of species ever to have existed:

100-250 million (1.4 million catalogued, about 2 million are known)

Number of species that now exist: **5-10 million**

Kinds of Species

Vertebrates: **42,580**

Reptiles: **6,300**

Birds: **9,040**

Mammals: **4,000**

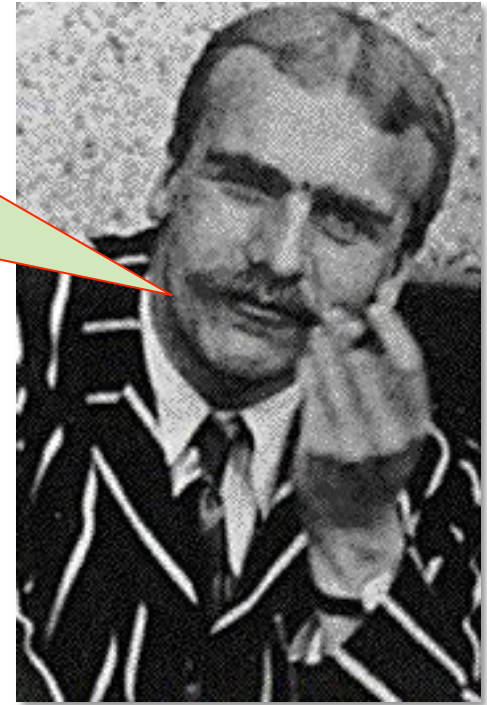
Invertebrates: **990,000** (of which **290,000** are beetles)

[E. O. Wilson, “The Little Things that Run the World” (1987)]

How Many Species are There?

God must have an
inordinate fondness for
beetles.

When asked by a group of theologians
what could be inferred about the mind
of the Creator from the works of His
Creation ...



J.B.S. Haldane
(1892-1964)

Mass Extinctions

Five “Natural Mass Extinctions” / One “Human”

Ordovician (440 million y.a.)

[25 million years (for biodiversity recovery)]

Devonian (365 million y.a.)

[30 million years...]

Permian (245 million y.a.) — 90% extinction

Triassic (210 million y.a.)

[100 million years...]

Cretaceous (66 million y.a.) — nailed the dinosaurs

[20 million years...]

Holocene (now) — 20% extinction within 20 years?

[?? million years...]

[E. O. Wilson, *Diversity of Life* (1992)]

Rates of Extinction

Currently Endangered Species

3079 animal and **2655** plants (2012; IUCN Red List)

Rates of Extinction

1600-1900: 1 every 4 years

1900-1960: 1 every year

1960-present: 100-40,000 per year

Biotic Impoverishment

How do humans contribute to species extinction?

Protecting Species

Endangered Species Act (1973)

**Convention on International Trade in Endangered
Species of Wild Fauna and Flora (CITES, 1973)**

The Snail Darter vs The God Squad (1977)

- Tellico Dam project on the Little Tennessee River
- TVA v Hill (U. S. Supreme Court, 1978)
- U.S. Congress amends the ESA to include a “God Committee” (Nov. 1978) that exempts species from federal protection.

Why do
Species Matter?

Speciesism and Endangered Species

May we treat California condors preferentially over turkey vultures?

“The fact that a being is or is not a member of species S is not a morally relevant fact, and does not justify treating that being differently from members of other species.”

Russow's Test Cases

The Snail Darter

The Père David Deer

The Red Wolf

The Baltimore and Bullock's Orioles

The Appaloosa Horse

Lab Rats

Malarial Mosquitoes

Zebras (and their Stripes)

Russow's Test Cases

These test cases demonstrate:

(1) Ambiguity surrounding the concept of species.

[red wolf & coyote]

(2) Mere diversity of species is not what matters.

[orioles; lab rats]

(3) Ecological role may not be important.

[Père David deer]

(4) The value of a species might rest on some distinctive feature. [zebras]

(5) The value of a species can be overridden by some other concern.

[*health*: mosquitoes; *economy*: snail darter]

Why Do Species Matter?

Traditional Answers

(1) Stewardship

(2) Extrinsic Value

- Anthropocentric?
- Ecocentric?
- Vital Evolutionary Links?

(3) Intrinsic Value

- Of species?
- Of diversity?
- Aesthetics?

Why Do Species Matter?

Russow's Answer

- (1) We value the **beauty** in the species (their aesthetic value).
- (2) This is grounded in **individuals**.
- (3) These individuals are valued more highly because they are **rare** (we have fewer opportunities to experience them).