Lecture 10, 23 Sept 2004
Van Dyke Ch 4 n 5

Conservation Biology
ECOL 406R/506R
University of Arizona
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1. Biodiversity
   - Van Dyke Ch 4

2. Paradigms and Theories
   - Van Dyke Ch 5
   - Thailand Study Abroad (isdsi)
   - Brazil (Antioch)

3. Lab Friday at computer lab (ECE 206)

4. Exam Tuesday next week
   Old Exam on website, review sheet?

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Genes From Engineered Grass Spread for Miles, Study Finds

Watrud et al. 2004, PNAS

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What is biodiversity?

Thanks to Chuck Price
How many species on earth?

Thanks to Chuck Price

What factors correlated with high diversity?

- Energy
- Precipitation
- Temperature
- Area
- Stable environment
- Moderate disturbance level

Thanks to Chuck Price

Threats to biodiversity – habitat loss

Species-Area Relationship

Woodlots vs. contiguous forest

Thanks to Chuck Price

Biodiversity Tid Bits

Species or DNA out of context?

Umbrella Species
Indicator Taxa (or structure or function, redundancy)
Keystone Species (bison)

Areas of high endemism for one group may not be high areas of endemism or BD for another group

Where is biodiversity?
One tree in Peru with same ant diversity as Britain

Thanks to Chuck Price
Species Area Relationship

Species-Area Relationship

3 step loss of biodiversity (Rosenzweig)

1. Endemics
2. Sink populations
3. Stochasticity

Therefore end up with lower steady state species richness and loss of biodiversity

-Endemism and Islands (Tuatura, Silversword)
-Island Biogeography

\[ S = cA^2 \]

\( S \) = species richness
\( c \) = taxon specific constant
\( A \) = area
\( Z \) = extinction coefficient for taxon

Figure 5.8
Species area curves and their relationship. More than one equation can be used to develop species-area curves. Presented are three equations that can be used to generate a graphical representation of a species area relationship, forming a species-abundance curve. After Fangliang and Legendre (1996).

Figure 4.6
When the size of a small island is decreased, the first species lost are endemics. Next, sink species (those that are not expanding fast enough to replace themselves) go extinct locally. Finally, failure to replace accidental losses fast enough brings the province to a still lower steady state of biodiversity. After Rosenzweig (1996).

Figure 5.19
A partial representation of the "end" of island biogeography applied to endemics. In each case, design A is considered species in design 5.

Endemics
Habitat Size
Habitat Loss

Habitat Heterogeneity
Population Variability
Bush Crickets

Van Dyke 2003
Chapter 5

-Metapopulations
-Genetic Diversity
-MVP, PVA
-Island Biogeography
-Disturbance

Metapopulation:

“Spatially disjunct groups of individuals with some demographic or genetic connection”

“largely independent yet interconnected by migration”

1. All local populations must be prone to extinction
2. Persistence of entire population requires recolonization of individual sites.

See p.193 in VanDyke text

Rana yavapaiensis
Lowland Leopard Frog
(Thanks to Don Sears, SNP)
Santa Cruz River

Environmental Stochasticity

Saguaro National Park - Rincon Mountain District
Schematic of Study Canyon, Saguaro NP

Environmental Stochasticity
Human Influences?

Pre-Monsoon, 2002

250 m
Metapopulation Dynamics

El Endo