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Conservation Biology
ECOL 406/506
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David Hall
Aquatic Conservation in Arizona
(Fish vs. Amphibs and Macroinverts)

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Community Ecology

What to expect in today's lecture:
• Definitions
• What factors structure communities?
• Example of a community study
• Class activity

Species Assemblages

Definitions

Community definitions:

"A group of organisms belonging to a number of
different species that co-occur in the same area
and interact through trophic and spatial relationships."

"The species that occur together in space and time."

Species assemblage definitions:

"the smallest functional community of plants or animals"

"The resultant community of species from those available"

"The species that seem to be appropriate for the question
being asked"

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Species Assemblages

Community ecology for the past 30 years has been very
controversial....the above definitions shed some light on
this, let's avoid the controversy as much as possible.

How? By using the same definitions and avoiding
jargon as much as possible.

An example of confusion: "The word "assemblage" has
often been used in the sense of a concrete community.
Not only is this an awkward word for a simple concept,
but the word also carries unwanted connotations. It
implies to some that species are independent and
noninteracting. In this book, we use the term
"community" in the concrete sense, without any
conceptual or theoretical implications in itself."

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<u>Species Assemblages</u>

Assemblage definition used in your book avoids the
controversy and is useful:

> "It is impossible to study
> every species in a
> community, as a result
> the group of species that
> is considered in the study
> is an *assemblage*."

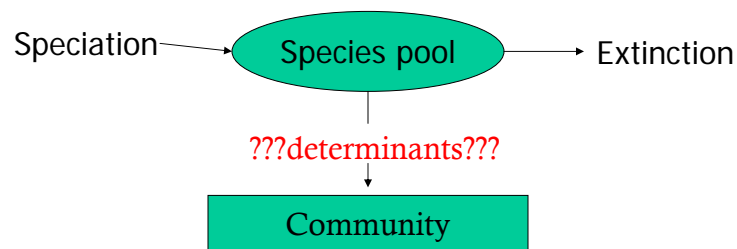But for the most part, ecologists usually just use the term
community....

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<u>Species Assemblages</u>

Community Ecology questions:

Why are some species in a community common
and some rare?

Why is the composition of species different in
one area compared to another area?

Ecologists start with the "species pool"

Speciation —→ Species pool —→ Extinction

???determinants???

Community

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<u>Species Assemblages</u>

Bouse dunes exercise is a useful, but partial, example
of community ecology question...

Typically ecologists outline a community by the biophysical
features and or plants in the area they study, in addition to
whatever organisms they want to study.

A simple example:

Valley bottom riparian   Mountain canyon riparian
(mesquite dominant)   (ash dominant)

Thamnophis marcianus   *Thamnophis cyrtopsis*
Masticophis flagellum   *Masticophis bilineatus*
Crotalus scutulatus   *Crotalus molossus*

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<u>Species Assemblages</u>

Community metrics

Species Richness
        Number of Species
Species Diversity/Evenness
        Number of Species and their relative abundance

        Example: *Shannon-Weiner index*

        Maximum value indicates that all species are
        represented by a similar abundance.

        Minimum value indicates that one species is
        dominant and all others are sparsely represented.

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<u>Species Assemblages</u>

Determinants of communities or species assemblages

Competition
Predation and parasitism
Habitat complexity
Physiological tolerances
Geographic features
History
      Evolutionary events (phylogenetic inertia)
      Stochastic Events
            -Immigration
            -Emigration
            -Extinction
      Human impacts

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<u>Species Assemblages</u>

Determinants of communities or species assemblages

Pattern, Process, and Mechanism

The only way to make sense of what determines structure in
a community is contextual.

A researcher must ask the question: what is the context I
find this community to be in?

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Species Assemblages

What do you mean contextual! I just want to know
what determines community structure????

 Answer: all the below, usually, well it depends....

Competition - it depends, generally a moot point.
Predation and parasitism - it depends, generally a moot point.
Habitat complexity - it depends but usually does
Physiological tolerances - definitely
Geographic features - definitely
History - decidedly, hard to sort out or understand...
        Evolutionary events (phylogenetic inertia)
        Stochastic events (past)
        Human impacts

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Species Assemblages

An example of a community study

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