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# Methods used in the study of diversity and taxon richness

by

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***A complete lecture on CD-ROM.***

***PowerPoint presentation introducing ecological techniques for measuring diversity***

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This study is divided into 2 lectures

### In lecture 1 we

- Introduce alpha, beta and gamma diversity
- Discuss the rank abundance relationship and descriptive models
- Introduce the species accumulation curve and how to smooth it
- Describe common alpha diversity indices
- Describe diversity ordering
- Use the Jackknife method to estimate standard error of an index
- Show a randomisation tests to determine if two communities are significantly different
- Describe the best equitability measures

### In lecture 2 we will cover

- Calculating beta diversity
- Estimating total species number (richness)
- Allowing for sampling effort – rarefaction
- Special scores for habitat quality - BMWP



While the quantitative measurement of diversity occurs in all branches of science the term is of particular significance in ecology

Linked to increased interest in conservation, the term biodiversity - a measure of the total genetic and ecological diversity is now in common use.



## The term biodiversity

Only by creating and applying reliable measures of diversity can we measure how biodiversity varies both spatially and temporally and thus recognise the influences that create and destroy it.



*Varzea habitat, Mamiraua Reserve, Amazonia*



## The need for diversity measures

A useful classification by Whittaker (1972) is

*$\alpha$ -diversity (alpha)*: the diversity of species within a community or habitat.

*$\beta$ -diversity (beta)*: a measure of the rate and extent of change in species along a gradient, from one habitat to others.

*$\gamma$ -diversity (gamma)*: the richness in species of a range of habitats in a geographical area (e.g. an island); it is a consequence of the alpha diversity of the habitats together with the extent of the beta diversity between them.

$\alpha$  and  $\gamma$  diversity are thus qualities that simply have magnitude and could, theoretically, be described entirely by a single number (a scalar).

$\beta$  diversity in contrast is analogous to a vector as it has magnitude and direction.

Their descriptions therefore require different approaches.

