Brittany Huntington
San Francisco State University, California

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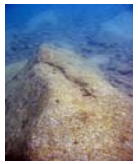
Biodiversity and Habitat Complexity: Niche Differentiation in an African Lake

Overview

Lake Tanganyika is an ideal system to test the theory that complex habitats support greater biodiversity. This lake has:

- A highly diverse ecosystem
- Numerous endemic species, including littoral snails
- Distribution and diversity patterns that are poorly understood

Observed snail distributions on rocky substrate

Questions

- Is niche differentiation a potential explanation for snail diversity and distributions?
- Are there any correlations between environmental factors and biodiversity?

Measures of Snail Diversity & Distribution
Species Richness
Density
Biomass

Measures of Productivity
Benthic Algal Biomass
Gross Primary Productivity (GPP)

Measures of Habitat Complexity
Grain Size Variation
Shoreline Angle
Structural Complexity

Importance

Increasing impacts from overfishing and deforestation make it crucial that we understand the factors supporting the extraordinary biodiversity of this lake so that we can better protect this ecosystem.

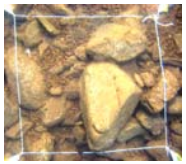
Scientific Approach

Hypothesis

Sites with high benthic primary productivity (snail food supply) and high habitat complexity (high niche complementarity) support greater diversity of snails.

Measurements

- Benthic primary productivity using chlorophyll a concentrations and dissolved oxygen fixation.
- Habitat complexity using grain size variation (a), shoreline angle, and benthic structural complexity (b)
- Diversity and distribution of snails using species richness, density and biomass (c, d)




a b c d

Citations: Rosenzweig, M.L. 1995. Species Diversity in Space and Time. Cambridge Univ Press. 436 pgs.

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Findings

My results suggest that habitat complexity plays an important role in structuring species diversity. These trends warrant further research into niche differentiation in this system.

Productivity

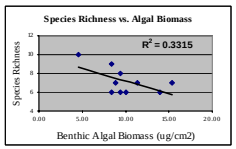

Fig 1

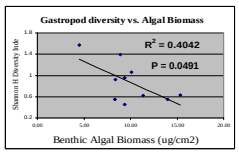

Fig 2

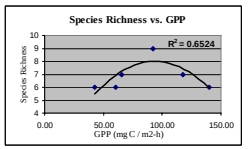

Fig 3

Fig 1 & 2 Increased primary productivity is correlated to decreased species richness and diversity. Competitive exclusion may be occurring in sites with greater food supply, allowing better competitors to dominate at the expense of poor competitors.

Fig 3 'Unimodal productivity pattern' of species richness across a productivity gradient. Several animal communities have shown this pattern, including marine snails (Rosenzweig, 1995)!

Habitat Complexity

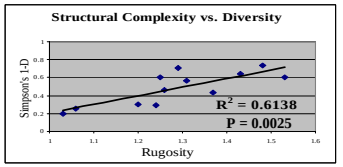

Fig 4

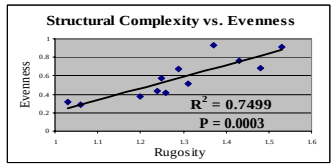

Fig 5

Fig 4 & 5 Structural complexity correlates positively with diversity. Evenness (a component of the diversity measurement) accounts for this correlation.

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