

## Abstract

Geographical variability in species richness and life-history strategies shows remarkable and well-documented patterns generated by various processes that have not yet been fully revealed. However, the pronounced correlation between spatial patterns in species and trait diversity and spatial gradients in environmental conditions indicates that the environment may modulate these processes. The mechanisms related to environmental productivity (energy availability), as a strong predictor of biodiversity, have been hypothesized to explain the cause of these broad-scale biodiversity patterns. Still, there is no consensus in the explanation, as many of the environmental and biotic factors are strongly interrelated. We have derived testable predictions that allowed disentangling the mechanisms responsible for spatial distributions of life-histories and species richness.

The patterns in spatial distribution of many avian traits across the striking productivity gradient in South Africa show a slow-fast continuum in life-history strategies. High environmental productivity in tropics may result in stable populations that favour slow life-history strategies; birds can utilize stable food resources - low food seasonality selects for small clutch sizes, long parental care and high juvenile survival. The inclusion of nest predation may also contribute to the clutch size spatial trends. Tropical life-histories are also indicated by the development of specific acoustic and visual signals. Cooperative breeding and the need for territory defence lead to long-term social bonds where the coordination between males and females can be represented by song in duets. Strong competition for reproductive opportunities, low visibility for predators and diverse food resources in tropics can result in colourful plumage colouration.

The prediction that population size-dependent extinction probability, resulting in species richness patterns, is determined by the amount of available resources, provides an interesting conception; not only the overall amount of environmental productivity, but also its temporal dynamics may drive population viability and consequently contribute to the large-scale patterns in species diversity and diversity of traits related to species persistence.