
Biodiversity: From evolutionary origins to ecosystem functioning and extinction

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Abstract

The amazing diversity of life on Earth is the direct result of evolutionarily unavoidable tradeoffs that all life has faced since, at the least, the Cambrian explosion. Because of such tradeoffs, newly emerging species coexisted with, and did not displace, established species. These same tradeoffs explain why greater diversity is associated with greater and more stable ecosystem productivity, and with increased resistance to invasion by novel species. Humans, the only species to escape these tradeoffs, caused waves of extinction of large land animals around the globe during the past 50K years. In this, the final period of rapid increases in human environmental impacts, another massive wave of species extinctions seems likely. Preventing this imminent extinction event will require greatly increased efforts at conservation and major changes to fossil fuel use, diets, and agriculture.

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