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The carrying capacity of ecosystem

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We analyse the concept of carrying capacity (CC), from populations to the biosphere, and offer a definition suitable for any level. For communities and ecosystems, the CC evokes density-dependence assumptions analogous to those of population dynamics. At the biosphere level, human CC is uncertain and dynamic, leading to apprehensive rather than practical conclusions. The term CC is widely used among ecological disciplines but remains vague and elusive. We propose the following definition: the CC is 'the limit of growth or development of each and all hierarchical levels of biological integration, beginning with the population, and shaped by processes and interdependent relationships between finite resources and the consumers of those resources'. The restrictions of the concept relate to the hierarchical approach. Emergent properties arise at each level, and environmental heterogeneity restrains the measurement and application of the CC. Because the CC entails a myriad of interrelated, ever-changing biotic and abiotic factors, it must not be assumed constant, if we are to derive more effective and realistic management schemes. At the ecosystem level, stability and resilience are dynamic components of the CC. Historical processes that help shape global biodiversity (e.g. continental drift, glaciations) are likely drivers of large-scale changes in the earth's CC. Finally, world population growth and consumption of resources by humanity will necessitate modifications to the paradigm of sustainable development, and demand a clear and fundamental understanding of how CC operates across all biological levels.

Palabras clave: ecosystem, community, stability, Biosphere, hierarchy theory, population, renewable resource management, resilience, sustainable development

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