Resolving the SLOSS dilemma for biodiversity conservation: a research agenda

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Abstract

In biodiversity conservation, the "SL > SS principle" that a single (or few) large habitat patches (SL) conserve more species than several small patches (SS) is used to prioritize protection of large patches while down-weighting small ones. However, empirical support for this principle is lacking; most studies find SS > SL. We propose a research agenda to resolve this dilemma by asking, "are there consistent, empirically-demonstrated conditions leading to SL > SS?" We develop a hypothesis to answer this question, the "SLOSS cube hypothesis," which predicts SL > SS only when all three of the following are true: between-patch movement is low, population dynamics are not influenced by spreading-of-risk, and large-scale across-habitat heterogeneity is low. We then propose methods to test this prediction. Many tests are needed, comparing gamma diversity across multiple landscapes varying in number and sizes of patches. If the prediction is not generally supported across tests, then either the mechanisms leading to SL > SS are extremely rare in nature, or they are outweighed by countervailing mechanisms leading to SS > SL (e.g. lower competition or higher immigration in SS), or both. In that case, the SL > SS principle should be abandoned.

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1