Resolving the SLOSS dilemma for biodiversity conservation: a research agenda

Lenore Fahrig¹, James Watling², Carlos Arnillas³, Víctor Arroyo-Rodríguez⁴, Theresa Jörger-Hickfang⁵, Jörg Müller⁶, Henrique Pereira⁵, Federico Riva¹, Verena Rösch⁷, Sebastian Seibold⁸, Teja Tscharntke⁹, and Felix May¹⁰

¹Carleton University
²John Carroll University
³University of Toronto-Scarborough
⁴Universidad Nacional Autónoma de México
⁵German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig
⁶Bavarian Forest Nationalpark
⁷University Koblenz - Landau
⁸Technische Universität München
⁹University of Goettingen
¹⁰Freie Universität Berlin

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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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