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Peer Review

Review of: "A Quantitative Analysis of Co-occurrence Matrices in Ecological Systems: Measuring Connectance and Entropy"

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This article presents an intellectually rich and historically grounded attempt to formalize connectance in ecological systems through an entropy–negentropy framework applied to pairwise co-occurrence matrices. The main strength lies in revisiting and extending a 1972 formulation, integrating information theory, graph theory, and phytosociological concepts, and systematically comparing H(C), K(C), and redundancy with alternative metrics (Ricotta & Szeidl entropy, eigenvalue evenness, chi-square, nestedness indices, etc.). The demonstration using both synthetic matrices and structurally distinct but edge-constant graphs is conceptually elegant, and the strong correlations support the internal consistency of the proposed index. However, the manuscript would benefit from substantial improvement in clarity, structure, and positioning: (1) the Introduction and Discussion are overly long and partly autobiographical—these sections should be condensed and refocused on the specific novelty relative to contemporary network ecology and weighted connectance literature; (2) the mathematical derivations (especially formulas 3–6) require clearer stepwise explanation, notation harmonization, and possibly a worked numerical example to improve accessibility; (3) the ecological implications remain largely conceptual—adding at least one real empirical dataset (e.g., plant community or interaction network data) would greatly strengthen external validity; (4) the interpretation of “negative entropy” and its ecological meaning should be clarified to avoid confusion with thermodynamic negentropy; (5) limitations, assumptions (binary vs weighted matrices, sensitivity to matrix size M, scale dependency), and comparison with modern network metrics (e.g., weighted connectance, modularity, spectral metrics) should be explicitly discussed; and (6) the language should be tightened, with shorter paragraphs and clearer subsection headings to enhance readability. Overall, the work has strong theoretical potential but

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requires structural refinement, clearer methodological exposition, and stronger linkage to contemporary ecological network research to increase its impact.

Declarations

Potential competing interests: No potential competing interests to declare.