Scopus

Documents

Ahmed, D.A., van Bodegom, P.M., Tukker, A.

Evaluation and selection of functional diversity metrics with recommendations for their use in life cycle assessments
(2019) *International Journal of Life Cycle Assessment*, 24 (3), pp. 485-500. Cited 2 times.

Abstract
Purpose: In life cycle assessments (LCAs), the focus of modelling the impact of human-induced pressures on biodiversity has been mainly on taxonomic diversity measures such as species richness. More recently, increasing availability of trait data and the understanding that functional diversity is more directly related to human-induced pressures suggests functional diversity as a promising metric. One major challenge relates to the selection process of the correct metric. Our purpose is to categorise and identify appropriate metrics of functional diversity for LCA model developers based on a justified choice of its structural properties and its links to human-induced pressures. Methods: We conducted a meta-analysis of literature to identify those functional diversity metrics that are frequently applied (not necessarily within LCA studies) and that possess a strong link to ecosystem functioning and human-induced pressures. Also, we provide a compilation of metrics that conform to important and desirable structural properties stipulated from literature. By reconciling these highlighted key properties with the strength of metric link, we make propositions for functional diversity use in LCA. Results and discussion: To capture impacts on functional diversity, the combination of functional richness, evenness and divergence needs to be considered. The mean strength of functional diversity metrics was highest for temperature rise and CO 2 elevation, as related to climate change, and less to eutrophication and land use change. Studies on impacts of water use change and other important human-induced pressures on functional diversity seem not available. When combined with desired structural properties such as independence and scale invariance, a combination of functional dendrogram (FR D), functional evenness (FE m) and functional logarithmic variance (FD var) is preferred to comprehensively determine human impacts on biodiversity in LCAs. However, if a set of multi-dimensional components is sought, then the best option is functional volume (FR V), functional evenness (FE m) and functional divergence (FD m). Conclusions: Through this reconciliation of usage, mean strength and key properties, the LCA model developer is able to apply consistent and useful metrics in LCA studies. © 2018, The Author(s).

2-s2.0-85046670198
Document Type: Article
Publication Stage: Final
Source: Scopus
Access Type: Open Access