



Land Use in LCIA: an absolute scale proposal for Biotic Production Potential

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Land Use in LCIA: an absolute scale proposal for Biotic Production Potential.

Environmental impacts caused by land occupation and transformation have been bypassed in many LCA studies due to soils' multifunctionality and the interconnectedness between the ecosystem services they provide. These inherent modelling complexities have traditionally forced LCA practitioners to content with a mere quantification of Land Use (LU), as surface area and duration (in m² or ha and years) appropriated by humans, without further analysis of the impact pathways derived from those land uses. Milà i Canals established the first comprehensive, basic framework for taking soil quality aspect into LCIA that reached acceptance among the LCA community. Through contributions from UNEP-SETAC's special task force on LU, great progress has ensued in developing further such LCIA. Building on the latest proposal by Koellner et al. and with the aim of bringing the Planetary Boundaries thinking into LCA, the present study proposes a single absolute scale for the midpoint impact category (MIC) of Biotic Production Potential (BPP). It is hypothesized that, for an ecosystem in equilibrium (where NPP equals decay), such an ecosystem has reached the maximum biotic throughput subject to site-specific conditions and no externally added inputs. The original ecosystem (or Potential Natural Vegetation) of a certain land gives then the maximum BPP with no additional, downstream or upstream, impacts. This Natural BPP is proposed as the maximum BPP in a hypothetical Absolute Scale for LCA's Land Use framework. It is argued that this maximum BPP is Nature's optimal solution through evolution-adaptation mechanisms, which provides the maximum matter throughput subject to the rest of environmental constraints (without further impacts). As a consequence, this scale rises a *Land Use Optimality Point* that suggests the existence of a limit regarding the maximization of divergent objectives with bioenergy. It will be attempted to model that beyond this point, and for the land available within a country, if the objective of Climate Change mitigation through bioenergy is further maximized, then the Fossil Fuel displacing objective will decrease, and vice versa.

Session: Advancements in LCIA and footprint method development.

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