

How do we establish methods to assess the impact of agricultural production on soil functions in LCA?

Sandra Eady¹, Cécile Bessou², Serenella Sala³, Tim Grant⁴

¹CSIRO Agriculture, New England Highway, Armidale NSW 2350, Australia, sandra.eady@csiro.au

²CIRAD, UPR Systèmes de pérennes, pôle ELSA, F-34398 Montpellier, France

³European Commission, Joint Research Centre, via Enrico Fermi 2749, 21027 Ispra (Va), Italy

⁴Life Cycle Strategies, 17 Kerr Street, Fitzroy VIC, Australia

Soil quality attributes, and their contribution to soil function, are inherently linked to agricultural productivity, and the long-term sustainability of agriculture relies on protecting and improving the soil resource. The influence of soil quality on productivity and ecosystem services has been under-represented in Life Cycle Assessment (LCA) to date. Recent efforts by the UNEP-SETAC Life Cycle Initiative and the European Commission JRC have devised impact assessment frameworks that capture the eco-system service functions of land, including soil functions. However, there is still ambiguity over the terms used to describe soil processes, elementary flows, and impact indicators. This paper explores important soil processes that drive soil functions, identifies how elementary flows can be estimated, and explores how different aspects of soil quality can be characterised to give an integrated assessment of impact. In doing this, we define the language and terms used in the impact pathway that will help delineate inventory development from development of impact assessment methods. We discuss how the tools now available, through the growth of GIS data on land use, soils, and climate, open up the opportunity to parametrise LCI directly with the relevant elementary flows, and construct LCIA methods, so that they are matched to real production systems.