

61 Soil Organic Carbon, climate change, and soil quality: a mapping of existing methods for LCA A. Benoist, CIRAD / UPR

BioWooEB ELSA research group; C. Bessou, CIRAD / UPR Système de pérennes Pôle ELSA. Land use interventions lead to a great variety of impacts on the environment, including modification and fragmentation of habitats, or alteration of soil properties, resulting in effects on soil fertility, climate change, or water filtration and regulation. Among parameters describing soil properties, Soil Organic Carbon (SOC) plays a key role: it is one of the main descriptors of soil quality, closely linked to soil fertility, and it is also crucial for climate change as it represents a global carbon stock of 1500-2400 GtC, i.e. around three times that of atmospheric carbon. Consequently, SOC can be considered in many different methods for LCA, dealing with LCI or LCIA, with soil quality or climate change issues. There is thus a need for LCA practitioners to better understand the diversity of these methods, their various purposes and coverages, their differences and potential complementarities. This study aimed at mapping LCA-related methods dealing with SOC effects on climate change and soil quality. Some methods, not dealing directly with SOC but considering soil quality or effects of the carbon cycle on climate change, were also included for a more comprehensive mapping. More than 30 method proposals were identified in the literature and considered. Variations of a same method, i.e. based on a common principle but involved in different guidelines, or using different data, were grouped together. For instance, the characterisation models proposed by Milà i Canals et al. (2007) to assess land use impacts on life support functions, and by Brandão & Milà i Canals (2013) to assess land use impacts on biotic production, are based on the very same model but developed at different scales and using different data sources. Then, links between methods or groups of methods sharing a common conceptual baseline were clearly identified. For example, dynamic LCA as defined by Levasseur et al. (2010) to deal with temporal GHG emission profiles and ILCD recommendation to take into account delayed CO₂ emissions (EC-JRC, 2010) are based on a common theoretical principle but differ in terms of implementation. Finally, this mapping helps to differentiate between marginal variations and critical sound differences among the great diversity of existing methods. It also allows for identifying relevant methods and proposing specific recommendations to take into account SOC in LCA.