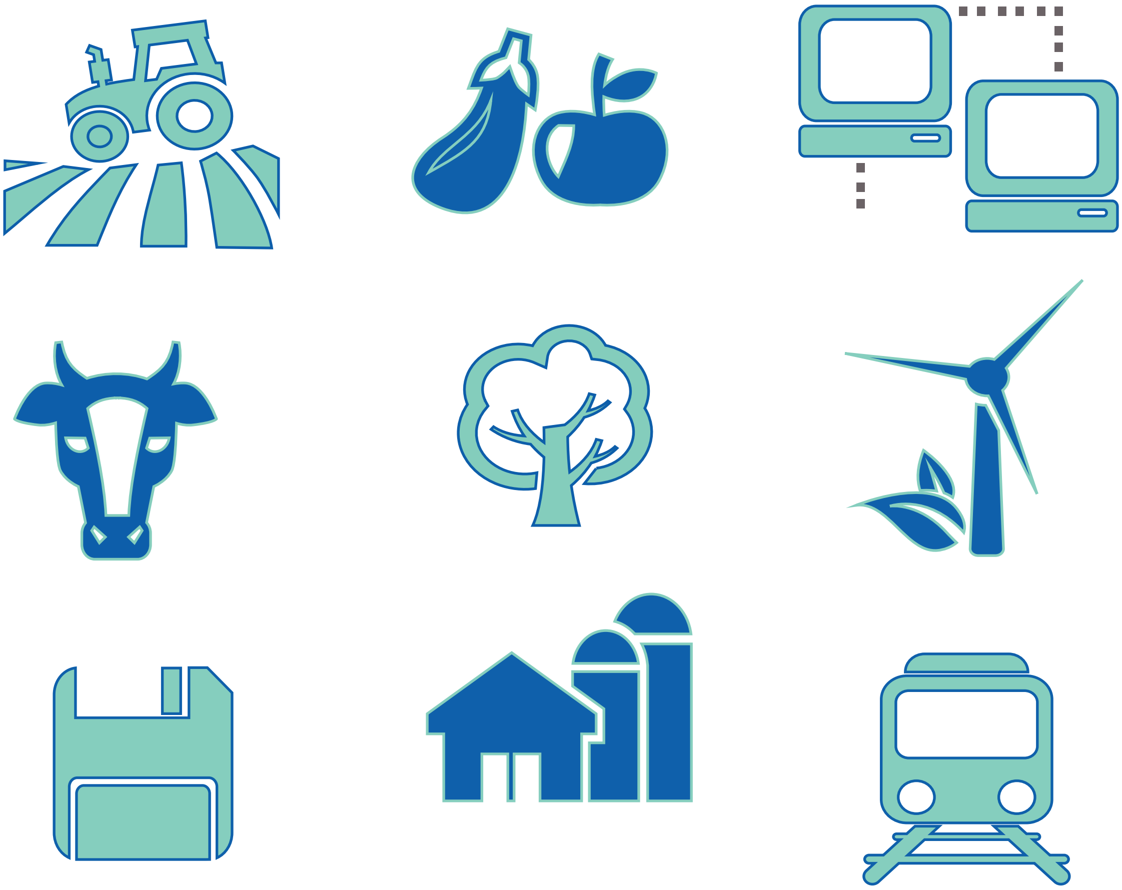
SETAC EUROPE 24th LCA SYMPOSIUM

24–26 September 2018 I Vienna, Austria

Abstract Book



The Role of LCA in Shaping the Future: Food, Fibre, Feed, Fertiliser, Fuel and Other Resources issue is linked to the issue of temporal weighting which is mostly only common in Life Cycle Costing by discounting. While time horizons are often simply fixed or assessed by scenario or sensitivity analyses, discounting is mostly neglected. We show in our review, that most LCAs use some kind of discounting, especially a short and fixed time horizon. We suggest further investigations on discounting in LCA because using discount functions would transfer the uncontinuous and arbitrary limiting of time horizons to a continuous, easy to understand and in case of monetization of impacts already widely used solution.

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Considering water and soil conservation works in Life Cycle Assessment: focus on contour ridges and erosion impacts

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Soil is a rare natural resource and it is at the center of the main issues in agronomy, environment and land use planning. At global level, erosion is one of the major soil degradation processes and it is responsible for the decrease in agronomic potential of soils and in agricultural land surfaces. Water and soil conservation works (WSCW) are built to protect soil from erosion. The financial and environmental cost the WSCW construction is very high. However, the positive impacts of WSCW are not taken into account in Life Cycle Assessment (LCA). The objectives of this study is to intergrate the impact of WSCW on soil quality in LCA. There are different types of WSCW with different functions and they act differently on erosion process. In this study we focussed on contour ridges (CR) because they are associated to crop systems. CR are generally built in upland areas to reduce runoff and erosion, to increase on-site deposition of eroded particles and to increase local water infiltration. They modify water and soil flows at catchment scale, so it is necessary to use a model able to calculate the inventory flow at the catchment and not at the plot level. In this study we present a methodology to integrate the impact of CR on topsoil erosion at the catchment level and to compute characterization factors in presence of such WSCW. The proposed method was applied in a case study in semi-arid context in central Tunisia (Merguellil watershed) which presents the issues of over-exploitation of water resources, accelerated land degradation and a high expansion of conservation works. In order to investigate the impact of WSCW on topsoil erosion, diffrent catchment scenarios (with and without CR) and land use types were tested using soil redistribution model (LandSoil model). For life cycle impact assessment, we focussed on two midpoint impact categories of LANCA soil functions : erosion resistance and mechanical infiltration. The CFs were calculated using the two models : LANCA and LandSoil models. These CFs were then compared. The results showed how contour ridges can modify topsoil erosion process, the erosion impact depend on location of landuse and contour ridges increase mechanical infiltration of soil. However, these impacts were not considered in LANCA model. In conclusion, It is necessary to integrate the positive impacts of contour ridges in life cycle assessment. It will be also neccessary to integrate the impact of the other types of WSCW.

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Why Region matters - Integration of Regional Aspects in Environmental Assessment - A Literature Review

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The international standard ISO 14040 on Environmental management – Life cycle assessment – Principles and framework (2009) depicts life cycle assessment (LCA) as an efficient and extensive tool to assess environmental impacts of products, systems or services, including all life cycle phases from raw material acquisition to production, use-phase and end-of-life. However, besides the opportunities of LCA, also the limitations are stated: One major limitation is seen in the lack of spatial relations in the inventory data to conduct the impact assessment (ISO 14040:2009), resulting in uncertainties. Environmental impacts by resource extraction and use of resources or emissions may vary notably, depending on the attributes of the surrounding ecosystem. Therefore, the first part of the doctoral thesis focuses on the question, how the spatial dimension of sustainability is addressed in literature. In literature, regionalization of environmental impacts is a frequently approached topic (Hoekstra 2016, Hauschild, 2006, 2013), in conceptive as well as in case studies on LCA. To obtain an overview of scientifically approaches on how to integrate the existing regional environmental situation in environmental assessment or management techniques, a strategic literature review was conducted. The review gives a compiled overview of the scientifically used methods on how to address regionalization in environmental assessment. Within about 500 publications, various sectors or branches and corresponding resources, indicators and related spatial scales, as well as limitations and potentials were identified and visualized. The results demonstrate relevant scientific approaches, to include the spatial dimension in environmental assessments. It is also shown how important spatial differentiation is to reduce uncertainties in LCA.

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Personal care products as emerging concern: how do they affect the aquatic systems?

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The items most people think of as "personal care products (PCPs)" are generally regulated by the U.S. Food and Drug Administration (FDA) either as cosmetics or as drugs. As defined under the Federal Food, Drug, and Cosmetic Act, cosmetics are intended to cleanse or beautify (for instance, shampoos and lipstick), or to affect the structure or function of the body (for instance, sunscreens and acne creams) [1]. These compounds and their bioactive metabolites can be continually introduced to the aquatic environment as complex mixtures via a number of routes but primarily by both untreated and treated sewage [2]. Aquatic pollution is particularly troublesome because aquatic organisms are captive to continual life-cycle, multigenerational exposure. However, little evaluation of possible risks or consequences to the aquatic environment has been provided. Therefore, the objectives of this study are to determine the combined toxicities of 23 PCPs on Q67 in the exposure times of 0.25 and 12 *h* by the microplate toxicity analysis and illustrate the effects of PCPs to aquatic environment. The short-term (0.25 *h*) and long-term (12 *h*) microplate toxicity analysis (S-MTA and T-MTA) were used to determine the effects of single PCP to *Vibrio qinghaiensis* sp. -Q67 (Q67) [3] . The effect (E) or toxicity of a PCP on Q67 was expressed as the inhibition ratio. The concentration (C) – inhibition ratio (E) data were fitted by the non-linear least square to form the concentration-response curve (CRC) [4]. For monotonic sigmoid-shaped CRCs and non-monotonic J-shaped (hormetic) CRCs fitted by software APTox [4] and JSFit [5]. In conclusion, the short-term CRCs of 23 PCPs are monotonic sigmoid-shaped (S-shaped), and the long-term CRCs of six PCPs are also S-shaped but the long-term CRCs of the other 17 PCPs are non-monotonic hormetic or J-shaped. The maximum stimulative effect (E_{min}) of the 17 PCPs is distinct, which is from 19.1% to 167.7%. The ranges of EC_{50}s are almost similar, from 5.461E-2 to 1.401E-1 */df*. As cosmetics are a significant part of the body chemical burden [6] and finally released into the aquatic systems, it is important to finding ways to increase transparency around ingredients without compromising intellectual property rights, developing criteria for evaluating sustainable chemistry in products, and developing new preservatives. **The contribution is in relation to a PhD thesis.**

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TBD

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Allocation approaches to deal with the cascading use of resources along a water treatment chain: the case of the resource footprint of sewage sludge valorisation in the Netherlands

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The paradigm shift from a linear to a circular economy has consequences on the way the sustainability of products and waste production/processing needs to be assessed. Some methodological approaches commonly used today to conduct Life Cycle Assessment (LCA) of such products become questionable when it comes to comparing (partially) recycled products with virgin material-based products. If waste streams are considered as a resource and not as a waste, it implies that part of the upstream environmental burdens should be allocated to the downstream products to allow a fair comparison with the equivalent products obtained from raw materials. This means that the "zero burden" assumption usually followed when evaluating the impact of resource recovery from waste in LCA studies (Ekvall et al., 2007) is becoming more and more questionable and allocation approaches should be applied to allocate part of the upstream environmental burdens to the recovered products. This presentation presents the application of different approaches to allocate the environmental burdens of upstream processes (in this case consumer goods, food and drinks consumed by households) to products obtained from household wastewater, through sewage sludge valorisation. These approaches are based on allocation formulas previously proposed to deal with the cascading use of materials (Allacker et al., 2017) but so far never applied in the wastewater treatment sector. They are applied to the case study of the processing of sewage sludge from the wastewater treatment plant of Eindhoven (The Netherlands) to produce fuels, chemicals and building materials. The resource footprint of these products is presented and the consequences of applying five allocation approaches is discussed.

Quantifying the uncertainty and variability of footprints and implications for policymaking (II)

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