Toward Harmonizing Ecotoxicity Characterization in Life Cycle Impact Assessment

Ecosystem quality is an important area of protection in life cycle impact assessment (LCIA). Chemical pollution has adverse impacts on ecosystems at the global scale. To improve methods for assessing ecosystem impacts, the Life Cycle Initiative hosted at the United Nations Environment Programme established a task force to evaluate the state-of-the-science in modelling chemical exposure of organisms and resulting ecotoxicological effects for use in LCIA. Outcome of the task force work will be global guidance and harmonization by recommending changes to the existing practice in exposure and effect modelling in ecotoxicity characterization. These changes reflect the current science and ensure stability of recommended practice. Recommendations must work within the needs of LCIA in terms of (a) operating on information from any inventory reporting chemical emissions with limited spatiotemporal information, (b) applying best estimates rather than conservative assumptions to ensure unbiased comparison with results for other impact categories, and (c) yielding results that are additive across substances and life cycle stages and allow a quantitative expression of damage to the exposed ecosystem. Here, we report the current framework as well as discuss research questions identified in a roadmap. Primary research questions relate to the approach for ecotoxicological effect assessment, the need to clarify the method's scope and interpretation of its results, the need to consider additional environmental compartments and impact pathways, and the relevance of effect metrics other than the currently applied geometric mean of toxicity effect data across species. Because they often dominate ecotoxicity results in LCIA, metals pose a specific focus, which includes consideration of their possible essentiality and changes in environmental bioavailability. We conclude with a summary of key questions along with preliminary recommendations to address them as well as open questions that require additional research efforts. This article is protected by copyright. All rights reserved.

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REACH-4-USEtox
The overall objective of the REACH-4-USEtox project is to assess REACH registration data for use in the global scientific consensus model USEtox and apply USEtox to identify sensitive input parameters for characterizing the fate of chemical substances released to the environment and for characterizing related human and ecosystem exposures.
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The objective of the GLAM project is to run a global process aiming at global guidance and consensus building on a limited number of environmental life cycle impact category indicators developed within a consistent framework, and to identify the related research agenda. The deliverable would be a global guidance publication with a supporting web system that includes the limited number of 6 to 10 life cycle assessment (LCA) based environmental impact category indicators and the characterization factors (for various regions). It may also include guidance on how to best establish a particular regional impact category indicator in case global consensus on characterization factors cannot be achieved or makes no sense.
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