Characterisation modeling of marine ecotoxicity from metal emissions to be applied in Life Cycle Impact Assessment
Yan Dong, Quantitative Sustainability Assessment

**Background & objectives**
Metal emissions commonly dominate the life cycle impact assessment (LCIA) results for human toxicity and ecotoxicity. However, these results are heavily criticised, mainly due to the fact that metal bioavailability in the environment is suspected to be highly overestimated in the current models. Consequently, in many life cycle assessment (LCA) studies, aquatic ecotoxicity is currently not reported because the results are implausibly high compared to the other toxicity categories. This PhD study aims to improve methods for life cycle impact assessment of metals with focus on marine ecotoxicity.

**Main activities**
- Evaluate the applicability of freshwater ecotoxicity models to predict metal toxicity to marine organisms
- Model effect, fate and bioavailability of metals as affected by marine environmental chemistry
- Develop a new method for calculating characterisation factor of metals in marine waters
- Evaluate spatial variability of marine ecotoxicity characterisation factors.

**Expected outcome**
This study will provide sets of global-generic and spatially-differentiated marine ecotoxicity characterisation factors of metals for applications in LCIA. The new calculation routines will be implemented in the consensus model USEtox for widespread implementation of the results in LCIA.

**New value in relation to existing knowledge**
The new scientifically sound method for assessing toxic impacts of metals in aquatic ecosystems will fill internationally recognised methodology gaps in current models. Consideration of metal bioavailability as affected by aquatic chemistry is essential for introducing a new LCIA impact category marine ecotoxicity for better sustainability assessment of technologies.

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