Update fate, exposure and effects model USES-LCA with latest research and perform model calculations

Level: Bachelor or Master
Start: Anytime
Project form: Modeling (Excel, R)
Supervision: Rosalie van Zelm
E-mail: R.vanZelm@science.ru.nl

Background and short content of the project
Chemical behavior in the environment is often modeled with multimedia fate models. Also for use in life cycle assessment (LCA), multimedia fate models are used, combined with concentration-effect models to estimate the effects on environmental species or on humans per kg of chemical emitted. The Uniform System for the Evaluation of Substances adapted for LCA purposes, in short USES-LCA, is such a model, developed at the department of environmental science (Van Zelm et al. 2009). The model consists of a fate part, where concentrations in the environment are estimated, and an effect part, where the effects on humans and the ecosystem are determined from the concentrations in the environment.
The fate part is based on the SimpleBox model, which has recently been updated to 4.0 (Hollander et al. 2016). Not all latest developments, however, are included yet in USES-LCA, such as the implementation of layered ocean compartments and depth dependent soil concentrations.

The **goal** of the bachelor internship will be to familiarize yourself with USES-LCA, implement new work and to run some tests. In a master internship you are expected to go beyond existing updates in SimpleBox and to perform a real case study to compare results with the old version.

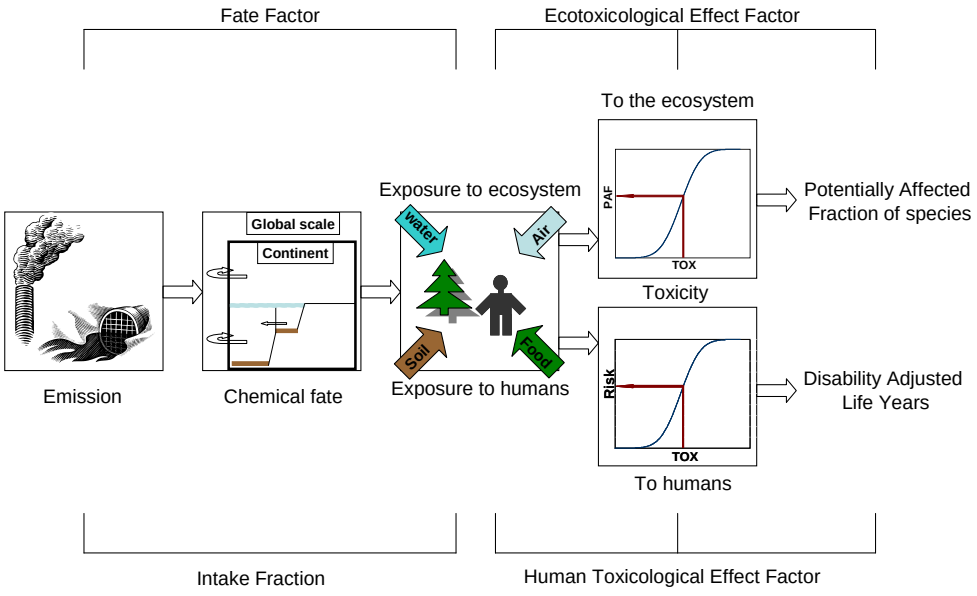

Figure 1: Schematic representation of USES-LCA 2.0.

Literature
Hollander A, Schoorl M, Van de Meent D. 2016. SimpleBox 4.0: Improving the model while keeping it simple... Chemosphere 148, 99-107.
Van Zelm R, Huijbregts MAJ, Van de Meent D. 2009. USES-LCA 2.0—a global nested multi-media fate, exposure, and effects model. The International Journal of LCA 14, 282-284.