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Indirect water management through Life Cycle Assessment: Fostering sustainable production in developing countries

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Life Cycle Assessment (LCA) represents a methodological framework for analyzing the total environmental impact of any product or service of our daily life. After tracking all associated emissions and the consumption of resources, this impact is expressed with respect to a few common impact categories. These are supposed to reflect major societal and environmental priorities. However, despite their central role in environmental processes, to date hydrological as well as hydrogeological aspects are only rarely considered in LCA.

Compared with standard impact categories within LCA, water is special. In contrast to other abiotic resources such as crude oil, it can be replenished. Total freshwater resources are immense, but not evenly distributed and often scarce in regions of high demand. Consequently, threads to natural water bodies have immense spatial dependency. Setting up functional relationships in order to derive a generally valid and practicable evaluation is tedious due to the complex, insufficiently understood, and uncertain natural processes involved.

LCA that includes the environmental effects of water consumption means global indirect water resource management. It supports goal-directed consumer behaviour that aims to reduce pressure on natural water systems. By developing a hydrologically-based assessment of potential impacts from human interaction with natural water bodies, “greener” products can be prioritised. More sustainable and environmentally friendly water management is the result. The proposed contribution presents an operational assessment method of global surface water consumption for impacts on human health and ecosystem quality within a LCA framework. A major focus is the issue of how such global assessment helps to quantify potential impacts from water-intensive production in developing countries, where the means for proper water management are often limited. We depict a compensation scheme for impacts related to water consumption that allows agriculture-dependent regions to produce and export crops while customers can compensate the related environmental impacts and/or improving the integrated water resource management by paying a premium. This allows for efficient international food production, strengthening sustainability regarding social, environmental and economic issues related to water and trade.