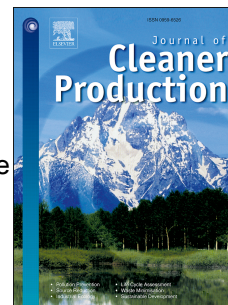


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# A web-based Toolbox to support the systemic eco-efficiency assessment in water use systems

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## Abstract

The eco-efficiency assessment of a water use system at the meso level, as well as the estimation of the anticipated eco-efficiency improvements as a result of innovative practices/technologies, is a conceptually and methodologically challenging issue. A systemic approach is required to capture the complexity of all interrelated aspects and the interactions among the heterogeneous actors involved in the system. This involves mapping the behaviour of the system into representative models, structuring the analysis in easy to understand procedures and developing versatile software tools for supporting the analysis.

This paper presents a web-integrated suite of tools and resources (EcoWater Toolbox) for assessing eco-efficiency improvements from innovative technologies in water use systems. Equipped with a continuously updated inventory of currently available technological innovations as well as a repository of eco-efficiency indicators and their evaluation rules, the EcoWater Toolbox supports a comprehensive four-step eco-efficiency assessment of a water use system: (1) allows the users to frame the case study by defining system boundaries, describing the water supply chain and value chains and including all the actors; (2) helps the users to establish a baseline eco-efficiency assessment, using the integrated modelling tools; (3) supports the users in identifying both sector-specific and system-wide technologies and practices to suit their situation, through the integrated technology inventory; and (4) enables the users to assess innovative technology solutions by developing predictive technology scenarios and comparing these with baseline results.

At the core of the Toolbox are two modelling tools, which combine both economic and environmental viewpoints into a single modelling framework. The "Systemic Environmental Analysis Tool" (SEAT), assists in building a representation of the physical system, its processes and interactions and forms the basis for evaluating the environmental performance of the system. The "Economic Value chain Analysis Tool" (EVAT), addresses the value chain and focuses on the economic component of the eco-efficiency. Both tools provide a graphical model construction interface that is implemented in client-side and incorporate advanced features such as model scripting.

The methodology adopted and the operational aspects of the EcoWater Toolbox are presented and demonstrated through the assessment of the eco-efficiency performance associated with the water value chain in the case of a milk production unit of a dairy industry.

**Keywords:** web-based modelling; eco-efficiency; water use system; value-chain; environmental assessment; eco-innovation

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