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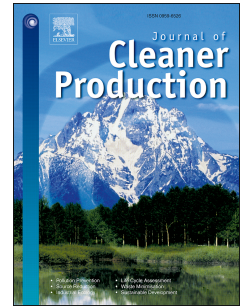
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Systemic eco-efficiency assessment of meso-level water use systems

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Abstract

Eco-efficiency has recently become an important concept of environmental decision making, serving as a policy objective and, if linked with resource efficiency, can be a measure of progress towards sustainability. The need for improving eco-efficiency leads to the challenge of identifying the most promising alternative solutions which improve both the economic and the environmental performance of a given system (“eco-innovations”). A methodological framework for the eco-efficiency assessment of a water use system at the meso level has been developed in the context of the EcoWater research project and consists of four distinct steps. The first step leads to a clear, transparent mapping of the system at hand and the respective value chain, while the second step provides the means to assess its eco-efficiency, following a life-cycle oriented approach using the midpoint impact categories. An important novelty is the distribution of economic costs/benefits and environmental pressures over different stages and stakeholders in the value chain. The third step includes the selection of innovative technologies, which are assessed in the last step and combined with mid-term scenarios in order to determine the feasibility of their implementation.

The proposed methodological framework has been applied to eight alternative water use systems, revealing all their environmental weaknesses and identifying potential opportunities for eco-efficiency improvement. At the same time, through the systemic approach all the involved actors are urged to cooperate in order to (a) propose and build innovative technological solutions that will improve the overall eco-efficiency of the system; and (b) make suggestions on the necessary policy framework that will facilitate and promote their uptake. This ensures that upstream decisions in the value chain are coordinated with downstream activities and all potential synergies are identified, leading to the creation of “meso-level closed resource loops” and thus the promotion of a circular economy.

Keywords: systemic eco-efficiency, water use systems, value chain, eco-innovation

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