

Environmental life cycle assessments for water treatment processes – A South African case study of an urban water cycle

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Abstract

The objective of this study was to generate information on the environmental profile of the life cycle of water, including treatment, distribution and collection and disposal (including recycling), in an urban context. As a case study the eThekweni Municipality (with its main city Durban) in South Africa was used. Another aim of the study was to compare the environmental consequences for the provision of normal, virgin potable water vs. recycled water to industry in Durban. Therefore, a series of environmental life cycle assessments (LCAs) were performed and environmental scores were calculated for the processes involved in the treatment, recycling and disposal of water and wastewater. In order to enable the addition of these scores the same approach was adopted and the same methodology was used and a final environmental profile was produced.

This study shows that a system approach as well as a process approach is needed for the integral assessment of the environmental performance in the provision of water and wastewater services. From the LCAs of individual processes involved in the provision of water and wastewater in the eThekweni Municipality, it emerged that the process with the highest contribution is the activated sludge process - used in the treatment of wastewater. However, when considering the entire system and including the losses in the distribution network for potable water, the process with the highest contribution became the distribution itself. An improvement analysis was performed and is presented. It takes into account a series of possible interventions and their consequences. Most notably, one conclusion of this study is that recycling as currently undertaken in Durban, has positive environmental impacts.

Keywords: urban water systems, recycling and reuse of water, water management, environmental impact