TOWARDS DIRECT WASTEWATER REUSE FOR POTABLE AND NON-POTABLE USES: AN URBAN WATER BALANCE, COSTING AND ASSESSMENT OF PERCEPTIONS AT A SOUTH AFRICAN COMMUNITY

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ABSTRACT:

South Africa is a semi-arid country with an average rainfall of 450 mm per annum. According to the Department of Water Affairs, the total registered water usage in 2013 met the estimated 2025 high water requirement of 17.3 billion m^3/annum. Therefore, the need had arisen to reduce water consumption and increase water supply to ensure the sustainability of our nation's water resources. Many studies show that wastewater reuse or water reclamation is an under-utilized and very viable water conservation concept in South Africa. The reuse of wastewater for direct potable or direct non-potable reuse is a highly debated topic requiring frequent engagement and investigation. Although direct reuse for potable uses is often more contentious than direct reuse for non-potable uses, it is worth investigating for possible future implementation at certain water scares areas. Hence, this study investigated the possibility of the future implementation of direct wastewater reuse at Hartbeesfontein - a selected South African community, for potable or non-potable use. The study incorporated potential users' perceptions, the cost implications of reuse and water saving potential by means of different water balance models.

The survey conducted, measuring the intention of the residents from Hartbeesfontein to accept direct wastewater reuse for potable and non-potable use, revealed the community's overwhelming acceptance (about 70%) of a reuse system should it be implemented in the future. The community's preference for wastewater reuse for non-potable use (75%) was higher than for potable use (67%).

Hypothetically, it would be possible to reuse 85% of the community's daily demand for potable use, if all the wastewater collected at the wastewater treatment plant could be treated. It would then mean that the municipality will only need to provide 15% of the daily water demand.

The option to reuse wastewater for non-potable use (i.e. to supply an industry) could save the community 22% its daily water demand.

In this study, the cost of wastewater treatment for potable use was approximately 350% higher than the cost of potable water supplied by the Midvaal Water Company. The cost of treating wastewater for non-potable use however was approximately 46% less than the cost of potable water supplied by the Midvaal Water Company.

By incorporating the outcomes of the water balance, perceptions of the community and analysis of the different wastewater reuse scenario costs, it was evident from the study that direct wastewater reuse for non-potable industrial application was the most viable water reuse option for Hartbeesfontein.

Keywords: Water balance model, wastewater re-use, potable and non-potable, perception, cost

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