



Emerging organic contaminants in urban and peri-urban groundwater sources in sub-Saharan Africa: A case study from Kabwe, Zambia

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Résumé/Abstract

To date water quality studies in Africa have focused on a narrow range of pollution indicators such as nitrate, ammonium, and faecal coliforms. Emerging organic contaminants (EOCs) include a broad range of industrial compounds including pharmaceuticals, water treatment by-products, personal care products, and biocides. Many of these compounds have not previously been detected or are not known to be significant in the aquatic environment. Within Africa very little is known about the occurrence of these compounds within groundwater, which could pose a risk to human health and groundwater dependant ecosystems. Furthermore, the likelihood of their occurrence is increased because of the continued importation of waste from the developed world. This paper addresses the distribution of EOCs within water sources in Kabwe, Zambia, which has been termed the most polluted city in Africa. Groundwater samples were obtained from a mixture of shallow hand dug wells and deeper boreholes across a range of housing densities and land uses. Repeat sample were taken in both the dry and wet seasons to investigate temporal differences. Detected compounds, in the 0.01-168 µg/L range, include plasticisers, pesticides, food additives, caffeine, industrial solvents. Compounds were most frequently detected within shallow hand dug wells, particularly those located within areas of high housing density. Deeper boreholes within the industrial zone of the city were relatively uncontaminated. The highly mobile insect repellent DEET was present in 85% of samples in the dry season and was ubiquitous in the wet season. Pesticides were more prominent in the wet season, probably as a result of their seasonal application during the main growing season combined with intense recharge events.