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Impact of seasonal variation on Escherichia coli concentrations in the riverbed sediments in the Apies River, South Africa

Akebe Luther King Abia ^{a,*}, Eunice Ubomba-Jaswa ^b, Maggy Ndombo Benteke Momba ^{a,*}

^a Department of Environmental, Water and Earth Science, Tshwane University of Technology, Arcadia Campus, 175 Nelson Mandela Drive, Pretoria 0001, South Africa

^b Natural Resources and the Environment, CSIR, PO Box 395, Pretoria 0001, South Africa

Abstract

Many South Africans living in resource-poor settings with little or no access to pipe-borne water still rely on rivers as alternative water sources for drinking and other purposes. The poor microbial quality of such water bodies calls for appropriate monitoring. However, routine monitoring only takes into consideration the microbial quality of the water column, and does not include monitoring of the riverbed sediments for microbial pollution. This study sought to investigate the microbial quality of riverbed sediments in the Apies River, Gauteng Province, South Africa, using *Escherichia coli* as a faecal indicator organism and to investigate the impact of seasonal variation on its abundance. Weekly samples were collected at 10 sampling sites on the Apies River between May and August 2013 (dry season) and between January and February 2014 (wet season). *E. coli* was enumerated using the Colilert®-18 Quanti-Tray® 2000 system. All sites tested positive for *E. coli*. Wastewater treatment work effluents had the highest negative impact on the river water quality. Seasonal variations had an impact on the concentration of *E. coli* both in water and sediments with concentrations increasing during the wet season. A strong positive correlation was observed between temperature and the *E. coli* concentrations. We therefore conclude that the sediments of the Apies River are heavily polluted with faecal indicator bacteria and could also harbour other microorganisms including pathogens. The release of such pathogens into the water column as a result of the resuspension of sediments due to extreme events like floods or human activities could increase the health risk of the populations using the untreated river water for recreation and other household purposes. There is therefore an urgent need to reconsider and review the current South African guidelines for water quality monitoring to include sediments, so as to protect human health and other aquatic lives.