

Environmental Monitoring and Assessment

High prevalence of multiple-antibiotic-resistant (MAR) *Escherichia coli* in river bed sediments of the Apies River, South Africa

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Abstract

This study aimed at investigating the presence of antibiotic-resistant *Escherichia coli* in river bed sediments of the Apies River, Gauteng, South Africa, in order to better inform health management decisions designed to protect users of the river. Overall, 180 water and sediment samples were collected at 10 sites along the Apies River from January to February 2014. *E. coli* was enumerated using the Colilert® 18/Quanti-Tray® 2000 (IDEXX). Isolates were purified by streaking on eosin methylene blue agar followed by the indole test. Pure *E. coli* isolates were tested for resistance to nine antibiotics by the Kirby-Bauer disc diffusion method. Over 98% of the isolates were resistant to at least one of the antibiotics tested. The highest resistance was observed against nitrofurantoin (sediments) and ampicillin (water). Over 80% of all resistant isolates showed multiple antibiotic resistance (resistance to ≥3 antibiotics). The abundance of *E. coli* in the sediments not only adds to the evidence that sediments are a reservoir for bacteria and possibly other pathogens including antibiotic-resistant bacteria but also suggests that antibiotic-resistant genes could be transferred to pathogens due to the high prevalence of multiple-antibiotic-resistant (MAR) strains of *E. coli* observed in the sediment. Using untreated water from the Apies River following resuspension for drinking and other household purposes could pose serious health risks for users. Our results suggest that river bed sediments could serve as reservoirs for MAR bacteria including pathogens under different climatic conditions and their analysis could provide information of public health concerns.