Relative Decay of Fecal Indicator Bacteria and Human-Associated Markers: A Microcosm Study Simulating Wastewater Input into Seawater and Freshwater

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Relative Decay of Fecal Indicator Bacteria and Human-Associated Markers: A Microcosm Study Simulating Wastewater Input into Seawater and Freshwater

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Fecal contaminations of inland and coastal waters induce risks to human health and economic losses. To improve water management, specific markers have been developed to differentiate between sources of contamination. This study investigates the relative decay of fecal indicator bacteria (FIB, Escherichia coli and enterococci) and six human-associated markers (two bacterial markers: Bacteroidales HF183 (HF183) and Bifidobacterium adolescentis (BifAd); one viral marker: genogroup II F-specific RNA bacteriophages (FRNAPH II); three chemical markers: caffeine and two fecal stanol ratios) in freshwater and seawater microcosms seeded with human wastewater. These experiments were performed in darkness, at 20 °C and under aerobic conditions. The modeling of the decay curves allows us (i) to compare FIB and markers and (ii) to classify markers according to their persistence in seawater (FRNAPH II < HF183, stanol ratios < BifAd, caffeine) and in freshwater (HF183, stanol ratios < FRNAPH II < BifAd < caffeine). Although those results depend on the experimental conditions, this study represents a necessary step to develop and validate an interdisciplinary toolbox for the investigation of the sources of fecal contaminations.


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