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To what extent can portable fluorescence spectroscopy be used in the real-time assessment of microbial water quality?

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The intrinsic fluorescence of aquatic organic matter emitted at 350 nm when excited at 280 nm is observed to correlate widely with water quality parameters such as biochemical oxygen demand. In sewage-impacted rivers, it might be expected that fluorescence at these wavelengths will also correlate with the microbial water quality. Here, we use a portable fluorimeter to assess the relationship between fluorescence intensity at this wavelength pair and Escherichia Coli enumeration in contrasting river catchments of poor water quality (in KwaZulu-Natal, S. Africa and the West Midlands, UK). Across all catchments we demonstrate a log correlation (r=0.76) between fluorescence intensity and Escherichia Coli over a seven-log range in Escherichia Coli enumerations. Within specific catchments, the relationship between fluorescence intensity and Escherichia Coli is more variable, demonstrating that catchment-specific interferences are also important. Our research demonstrates the potential use of a portable fluorimeter as a screening tool for microbial water quality, and one which is ideally suited to simple pollution scenarios such as assessing the impact of untreated sewage at specific sites.