
How effective is water quality monitoring using microbial indicators? A Canadian case study on agricultural pollution

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Abstract. Traditionally, microbial indicators are monitored to control the risk of illness from water-borne diseases. Pathogens, the prime cause of illness, are difficult and more expensive to monitor because they require specialized techniques and laboratory environment. Thus, they are not appropriate for use in routine monitoring. Water and health authorities set their standards based on the level of one or more indicator organisms. A three year study was recently conducted in Canada to evaluate the relationship between three indicators (total coliform, fecal coliform and *E. coli*) and several pathogens (*Campylobacter* spp., *Salmonella* spp., *E.coli* 0157:H7, *Cryptosporidium* spp., *Giardia* spp.) with the intention of using the relationship to derive a national *E.coli* environmental benchmark for waterborne pathogen contamination in agricultural watersheds. Water samples were collected on 902 occasions from 27 sites in four intensive agricultural watersheds across Canada during the years 2005-2007. In each watershed, a site not impacted by livestock and human fecal pollution sources was selected to act as a reference site. The objective of the paper is to discuss the study design, describe the data and present the issues involved in the statistical analysis and the logic used to derive the *E.coli* standard.

Keywords.
