Investigating *Escherichia coli* habitat transition from sediments to water in tropical urban lakes

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ABSTRACT

Background. *Escherichia coli* is a commonly used faecal indicator bacterium to assess the level of faecal contamination in aquatic habitats. However, extensive studies have reported that sediment acts as a natural reservoir of *E. coli* in the extraintestinal environment. *E. coli* can be released from the sediment, and this may lead to overestimating the level of faecal contamination during water quality surveillance. Thus, we aimed to investigate the effects of *E. coli* habitat transition from sediment to water on its abundance in the water column.

Methods. This study enumerated the abundance of *E. coli* in the water and sediment at five urban lakes in the Kuala Lumpur-Petaling Jaya area, state of Selangor, Malaysia. We developed a novel method for measuring habitat transition rate of sediment *E. coli* to the water column, and evaluated the effects of habitat transition on *E. coli* abundance in the water column after accounting for its decay in the water column.

Results. The abundance of *E. coli* in the sediment ranged from below detection to 12,000 cfu g^{-1}, and was about one order higher than in the water column (1 to 2,300 cfu mL^{-1}). The habitat transition rates ranged from 0.03 to 0.41 h^{-1}. In contrast, the *E. coli* decay rates ranged from 0.02 to 0.16 h^{-1}. In most cases (>80%), the habitat transition rates were higher than the decay rates in our study.

Discussion. Our study provided a possible explanation for the persistence of *E. coli* in tropical lakes. To the best of our knowledge, this is the first quantitative study on habitat transition of *E. coli* from sediments to water column.

Subjects Ecology, Microbiology, Freshwater Biology, Environmental Contamination and Remediation
Keywords *Escherichia coli*, Faecal indicator bacteria, Sediment, Decay rate, Habitat transition

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INTRODUCTION

Faecal indicator bacteria (FIB) are a group of bacteria used to evaluate water faecal contamination. Ideally, FIB should be of faecal origin only and not grow in the extraintestinal environment (*Rochelle-Newall et al., 2015*). Furthermore, the abundance of FIB should correlate with the presence of faecal contamination-related pathogen.