



Assessment of Fecal Indicator and Pathogenic Bacteria in Marine Outfalls of Colombo District, Sri Lanka

R.N.S. Sonali¹, A.K.M.M.K. Meddage², P.M. Manage², G.Y. Liyanage^{1,2*}

¹*Department of Aquatic Bioresources, Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura, Sri Lanka.*

²*Centre for Water Quality and Algae Research, Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka.*

**gyliyanage@sjp.ac.lk*

The pollution of coastal waters associated with improper wastewater discharge is an increasing environmental and public health concern in rapidly urbanizing regions worldwide. In Sri Lanka, marine outfall systems have been identified as major sources of coastal water contamination through the discharge of municipal sewage, particularly in urban areas such as Colombo. Limited studies have assessed microbial contamination at marine outfall discharge points in Sri Lankan coastal waters beyond physicochemical evaluations. Therefore, this study assessed fecal indicator and pathogenic bacterial contamination at 20 selected marine outfalls in Colombo, Sri Lanka. Water samples were collected in duplicate across two sampling events from each selected outfall between January–March 2026, resulting in a total of 80 samples. Sampling sites were selected based on population density, industrial and hotel activities, and proximity to sensitive zones, including recreational bathing areas and fisheries. The enumeration of fecal indicator bacteria, including total coliforms and *Escherichia coli*, was performed using the membrane filtration method with isolates confirmed through standard biochemical tests. *Salmonella* spp., *Shigella* spp., and *Vibrio* spp. were isolated using selective culture techniques and confirmed through biochemical tests. Results showed that *E. coli* concentrations exceeded the WHO recommended maximum level for recreational waters (200 CFU/100 mL) in 15 of 20 outfalls. *Salmonella* spp., *Shigella* spp., and *Vibrio* spp. showed 100% detection frequency (20/20 sites), indicating their widespread occurrence across the study area. These findings indicate sewage contamination and a persistent microbial pollution burden in Colombo's coastal waters, posing potential public health risks, including gastrointestinal and diarrheal diseases. Marine outfalls are therefore identified as critical point sources of microbial pollution, with associated risks to public health through recreational exposure, bathing, and seafood consumption. The study highlights the need for improved wastewater management, continuous monitoring, and stronger regulatory frameworks to protect coastal ecosystems and public health.

Keywords: *Coastal water pollution, Marine outfalls, Fecal indicator bacteria, Pathogenic bacteria, Public health risks*