PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar

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Application of Wastewater-based Epidemiology in Long Island, NY: Surveillance of SARS-CoV-2 and More.

Abstract

Since the COVID-19 pandemic began in 2020, wastewater-based epidemiology (WBE) has shown promises to monitor the SARS-CoV-2 viral levels in wastewater to track the spread, prevalence, and trends of COVID-19 infection in communities. WBE data can be more reliable and unbiased than clinical data, as the clinical diagnostic capacity is limited mostly to the population having symptoms, but not to all infected individuals including symptomatic, asymptomatic, pre-symptomatic, and post-symptomatic. Starting in April 2020, a WBE project was initiated to test the SARS-CoV-2 virus in wastewater influent collected from wastewater treatment plants (WWTPs) across Long Island, NY. SARS-CoV-2 RNA was consistently detected in WWTPs influents throughout the more than 2-year study. The relationship between SARS-CoV-2 RNA concentrations in WWPTs and COVID-19 cases in the community was investigated. SARS-CoV-2 influent viral load had a strong correlation with COVID-19 cases within a catchment and SARS-CoV-2 RNA concentrations were several days ahead of positive test results by reporting date. There were differences between WWTPs in their capacity to predict case numbers based on influent viral RNA load. WBE data can provide considerable advance notice of infection dynamics in communities.

Bio

Dr. Mian Wang is a Postdoctoral Associate in the Center for Clean Water Technology and the Department of Civil Engineering at Stony Brook University. Her current research focuses on novel treatment technologies for decentralized wastewater and biological remediation of groundwater with contaminants of emerging concerns. The research includes bioreactor operation and microbial function analyses involved in the natural/engineered treatment system. Dr. Wang earned her Ph.D. (2019) and M.S. (2014) in Environmental Engineering from Purdue University where her research focused on development and removal of antibiotic resistant genes (ARGs) in natural and urban environments and the application of environmental biotechnology to remove contaminants from water. Dr. Wang's main research goal is to promote water sustainability by applying and advancing environmental microbiology in order to reduce health risks, minimize energy consumption and carbon footprint. She specifically focuses on the following areas: (i) investigate the fate of antibiotic resistant bacteria and ARGs, pathogens, and chemicals in natural and urban environments, and (ii) develop cost-effective and energy-efficient biotechnologies to improve and establish more sustainable water and wastewater treatment processes.