University at Buffalo
Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences

Environmental and Water Resources Engineering

Stormwater modeling for emergency response: Research to understand the fate and transport of spores

Abstract: If a large outdoor area is contaminated by a biological agent, understanding how the contaminant spreads during precipitation events is important for sampling and decontaminating surfaces. This presentation will highlight ongoing modeling, bench, and field-scale research projects at the US Environmental Agency's (EPA) National Homeland Security Research Center (NHSRC) in Research Triangle Park (RTP), North Carolina and the EPA's Urban Watershed Research Facility in Edison, New Jersey. In RTP, the work includes using a rainfall simulator to determine stormwater washoff coefficients for *Bacillus thuringiensis kurstaki* (Btk) and *Bacillus globigii* (Bg), simulants for *Bacillus anthracis* – the causative agent of anthrax. These coefficients are in the process of being field verified using real rain events and by collecting runoff water from a non-trafficked parking lot at EPA's Edison facility. Custom technology was developed to conduct this research and will be discussed in this presentation. This includes the construction of a rainfall simulator, automated runoff samplers, telemetry for field sensors compliant with EPA server regulations, and custom python scripts for EPA's Stormwater Management Model (SWMM). The resulting information is available for use in anthrax- specific parameterization of stormwater models, provides a framework for other agents, and offers operational insights for sampling and decontaminating roadways.

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Dr. Anne Mikelonis is a researcher in the EPA's National Homeland Security Research Center's Decontamination and Consequence Management Divison. Her current work focuses on the fate and transport of biological and radiological contaminants in urban areas. Previously, her research focused on physical/chemical water and wastewater treatment processes, ceramic water filtration, and nanoparticle synthesis and characterization. This has included extensive fieldwork in Honduras and Ghana. Anne holds a B.S. in Civil Engineering from Northwestern University, a M.Eng. in Environmental Engineering from the Massachusetts Institute of Technology, and a PhD. in Environmental Engineering from the University of Texas at Austin. She is also a registered professional engineer in the state of North Carolina. Dr. Mikelonis enjoys being a director of the 501c3 nonprofit Clean Water Science Network which coordinates a mentoring program and facilitates research internships for undergraduate students from developing countries interested in engineering for underserved communities.

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