

# Environmental Engineering Seminar

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*The Astani Department of Civil & Environmental Engineering presents*



**Dr. Lutgarde Raskin**  
**Civil and Environmental Engineering**  
**University of Michigan**

Date: February 27, 2019

Time: 4 - 5 pm

Place: RRI 101

## **Can engineering controls shape the drinking water microbiome and reduce the risk of opportunistic infections?**

Biological treatment processes and particularly biofiltration have gained tremendous popularity in the drinking water field over the past decade. However, we do not yet understand how biofiltration, disinfection, and transport of treated water through distribution systems and building plumbing influence tap water and human microbiomes. Most microbes in biofilters mediate positive impacts through removal of contaminants, but others have the potential to cause disease. In high-income countries, the risk of waterborne infection is often due to exposure to opportunistic pathogens, such as *Legionella pneumophila* and nontuberculous mycobacteria. This presentation will show that these microbes, present in source water microbiomes, are only partially removed and sometimes are selected for by current treatment practices and therefore become integrated in the diverse microbial communities in drinking water. Waterborne infections by these microbes mainly affect immunocompromised individuals, a rapidly expanding subset of the population, and result primarily from inhalation of aerosols. These findings call for an increased understanding of how drinking water aerosols impact our respiratory tract microbiomes. We have begun to address this challenge by focusing on cystic fibrosis, a condition known to predispose individuals to polymicrobial respiratory tract infection. The presentation will conclude by discussing steps water quality engineers and drinking water utilities can take to reduce risk of opportunistic infections while maintaining drinking water treatment objectives.

### **About the Speaker**

Lutgarde (Lut) Raskin is the Altarum/ERIM Russell O'Neal Professor of Engineering at the University of Michigan. She is a pioneer in molecular microbial ecology applied to water quality control and anaerobic bioprocesses. Her research focuses on managing the microbiome of drinking water systems and developing anaerobic bioprocesses for resource recovery from waste streams. She has published about 130 peer-reviewed journal papers and 350 conference proceedings papers and abstracts. Dr. Raskin is passionate about graduate education and has mentored approximately 15 postdocs and 90 graduate students, including 25 PhD students. She received BS and MS degrees from the KU Leuven in Belgium and a PhD degree from the University of Illinois at Urbana-Champaign. Prior to joining the faculty at the University of Michigan in 2005, she was a faculty member at the University of Illinois at Urbana-Champaign. She is an elected Fellow of the American Academy of Microbiology and the Water Environment Federation. Past honors include the University of Michigan Rackham Distinguished Graduate Mentor Award, the International Society for Microbial Ecology-International Water Association BioCluster Award, the Association of Environmental Engineering and Science Professors Frontier Award in Research, the American Society of Civil Engineers Walter L. Huber Civil Engineering Research Prize, the Water Research Foundation Paul L. Busch Award, and a U.S. National Science Foundation CAREER Award. She is an Associate Editor for Environmental Science & Technology and serves on the Board of Directors of the Association of Environmental Engineering and Science Professors.