



The Department of Civil Engineering The City College of New York



Bruce Podwal Seminar Series

February 18, 2025, 12:15 to 1:00 PM

Venue: Exhibit Room, Steinman Hall

HARNESSING THE METABOLIC VERSATILITY OF WASTE MICROBIOMES TO ACHIEVE RESOURCE-EFFICIENT WATER

Kartik Chandran



Abstract

The wastewater cycle provides a rich framework to study the structure, function and interactions within mixed microbial communities. The design and operating conditions of biological wastewater treatment processes govern the ultimate structure, function, and metabolism of the resident microbial communities. Opening up these microbiomes allows us to harness their potential towards achieving multiple goals, including the production of clean water, the treatment of drinking water, and the synthesis of commodity chemicals and fuels, among others. Herein, we examine the microbial ecology, metabolism, and modeling aspects relating to wastewater treatment processes, focusing on links between the carbon, nitrogen, and phosphorus cycles. The metabolic basis for some of these interactions is then evaluated based on a more fundamental look at select members of such communities. Further, the interplay between conventionally understood protagonists of wastewater treatment and some newly discovered organisms is also discussed.

Speaker Bio

Dr. Kartik Chandran is Professor of Environmental Engineering at Columbia University. The main focus of Dr. Chandran's work is on understanding and re-engineering the microbial nitrogen cycle while exploring its links with the carbon, water and energy cycles. Applications of his work include energy and resource efficient technologies and approaches for biological wastewater treatment and sanitation.

Prior to Columbia, Dr. Chandran worked as a senior technical specialist with the engineering firm Metcalf and Eddy of New York, Inc., now AECOM, and as a research associate at Virginia Polytechnic Institute and State University. He has received the Water Environment Research Foundation's Paul L. Busch Award, the National Science Foundation CAREER Award, the MacArthur Fellowship and a National Research Council Fellowship. He has worked extensively on solving the global grand challenge of sanitation through his work across Africa and other developing economies. More details on Dr. Chandran's work can be found at <https://kchandranlab.wixsite.com/kclab>.