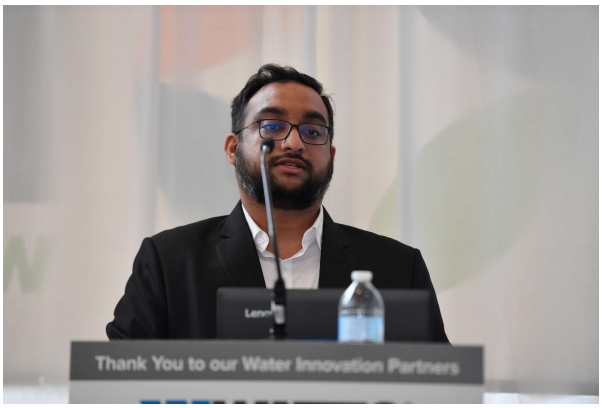
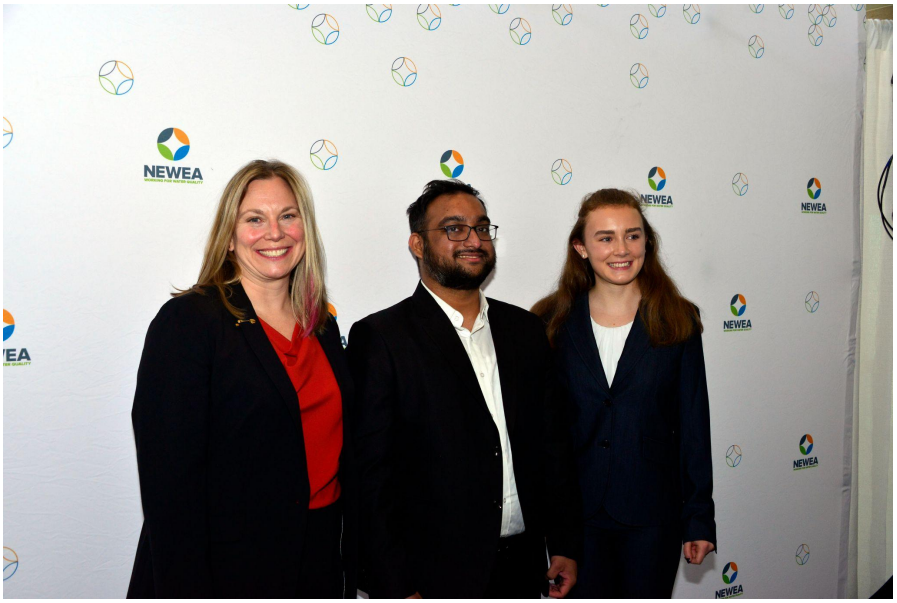
Student Innovation Shark Tank
- Innovation Pavilion -
NEWEA Annual Conference 2022

The 2022 NEWEA Annual Conference held yet another successful jointly sponsored event between the Student Activities Committee and the Innovation Council. The student “Shark Tank” competition, held at the Innovation Pavilion, drew in a large crowd to hear two students who were selected and offered the opportunity to provide a 5-minute presentation of their research project in a pitch-format to a panel of judges. This year, the judges were Dr. Christobel Ferguson from the Water Research Foundation, Dr. Jeffery McCutcheon from the University of Connecticut and the National Alliance for Water Innovation (NAWI), and Amy Corriveau from CDM Smith. The session was moderated by Dr. Marianne Langridge from Sustainable Synthesis, and current director of the Innovation Council.

The two projects selected, although entirely different in subject matter, both represented important aspects of water innovation and water quality improvement. Following the two informative pitch presentations, there was a flurry of Q&A from the judges. Both students did an excellent job answering the challenging questions that were presented to them. It was not an easy task for the judges to choose a winner. In first place was Kamruzzaman Khan, a PhD candidate from the University of Vermont with his project on phosphorus recovery from wastewater. Kitty Lovell, an undergraduate from the University of Massachusetts was awarded second place with her project on artificial floating wetlands on the Charles River. We look forward to hosting this event again at the 2023 Annual Conference.





Shark Tank Poster Abstracts

Oscillating Electric Field-Assisted Phosphorus Recovery as Struvite from Wastewater

Kamruzzaman Khan, James L. Jutras, Appala Raju Badireddy
University of Vermont

Phosphorus removal is a critical part of the wastewater treatment process. However, conventional phosphorus recovery techniques employed at the WWTFs require further treatment for field application. Consequently, novel technology has been devised where an oscillating electric field with chemically modified wastewater recovers phosphorus as ‘Struvite’ (MgNH4PO4.6H2O)- a fertilizer. A pulsed electric field (±3V at ±150kHz) and a wide range of

relative supersaturation was utilized to precipitate Struvite from the wastewater. The results show that this novel technique can recover up to 84±1%, 11±2%, and 67±2% dissolved phosphorus, NH4+-N, and Mg2+ respectively, as Struvite from wastewater without pH regulation. Besides, electric field exposed samples had 60-70% faster crystal nucleation and accumulated 30-70% more crystal. Finally, morphological analysis confirmed that the crystals are pure Struvite with an orthorhombic structure. Therefore, this study has demonstrated that oscillating electric fields and modified water chemistry can accelerate and form high-quality Struvite without pH administration, making it a potentially viable process for phosphorus recovery from wastewater.

Charles River Artificial Floating Wetland
Kitty Lovell
University of Massachusetts

Despite improvements made by E.Coli based standards for a swimmable river, cyanobacteria blooms plague the Charles River every year, making the river unuseable for recreation. Over the past two summers, researchers at Northeastern have studied the impact that an artificial floating wetland has on the Charles River. The first artificial floating wetland, located during the summers in the Charles River Lower Basin, is a pilot project made to study the native wetland plants and their role in improving the river ecology. To discern the wetland's effect on the river ecology, zooplankton abundance and body size along with cyanobacteria concentration measurements are monitored every summer.

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