

Wayne State University – Healthy Urban Waters

Recent Collaborative Activities with GLWA

These collaborations initiated with DWSD more than 30 years ago when DWSD and WSU Civil Engineering entered into a Co-Op program. This program served both WSU, DWSD, and the students - many of whom became career engineers with DWSD and then GLWA. More than 20 years ago, WSU provided a pump operations training class (at Huber Street facility) for more than 200 operators and engineers. More recently, these collaborations have centered on research/outreach/education in the WaterWorks Park Pilot Plant and training of GLWA chemists at the WSU iBIO building. Some snippets of recent collaborations:

- WSU, through the Zhang SWEET Lab, has been analyzing microplastics in the raw water as measured in the Water Works Park Treatment Plant using Nile Red dye coupled with microscopy techniques and automated image analysis. In addition, a study investigating the removal of endocrine disrupting compounds (4-nonylphenol) has been finished in the pilot plant by WSU students Vittoria Veltri and Michael Dunne who are both working in GLWA. Two journal manuscripts (one for microplastics and the other for 4-nonylphenol) with coauthors from GLWA are under preparation and will be submitted this fall. Two conference papers were presented:
*Zhang, Y., Diehl, A., Lewandowski, A., Cheng, M., Miller, C. Occurrence and Fate of Microplastics in Water Treatment Systems, IAGLR 2019 Annual Conference, Brockport NY, 2019 June 10-14 (oral presentation).

*Zhang, Y., Vittoria Veltri, Kishore Gopalakrishnan, Carol Miller, Shawn McElmurry. Occurrence and Fate of Chemicals of Emerging Concern (CECs) and Their Interactions with Microbiome in Urban Water Cycles. NIEHS SRP 2017 Annual Conference, Philadelphia, December 06-08, 2017.
- WSU, through the Baker WATER Lab and HUW, has collaborated with 4 GLWA chemists over the past year, with 2 more starting in the next month. As part of the collaboration, the chemists receive extensive training on LC-MS analytical equipment and are involved with the investigation of the developmental and health effects of PFAS, microplastics, microbiome changes, and DisposeRX. The chemists have combined both of these skills to evaluate the efficiency of DisposeRx. They have interacted with WSU faculty, staff, and students, increasing awareness of GLWA.
- WSU, through the Baker Water Lab, has also utilized the pilot plant to evaluate developmental and health effects of contaminants in Detroit River water. The Baker Lab is currently working to secure more zebrafish research opportunities at the facility and also utilizes the SPE concentrator and microscope to evaluate effects and

contaminant levels. This zebrafish setup in the pilot plant is very unique and allows for real-time chronic exposure to environmentally relevant contaminants and conditions. Dr. Baker has been invited to give seminars nationally and internationally at scientific meetings, community gatherings, as well as with the media and politicians about this collaboration. This outreach is always met with large interest in the projects and a good impression of GLWA and the collaboration.

- WSU, through Healthy Urban Waters, has collaborated with Lake Huron Plant engineers on optimal “emissions-efficient” operations focused on the filter washing operations. Through this interaction, the Huron plant became familiar with the LEEM software, and collaborated with AWWA on the Great Lakes Water Utility Energy Challenge, receiving accolades from AWWA, Great Lakes Protection Fund, TPO magazine and others. Lake Huron Plant significantly reduced carbon and mercury footprint of their electricity operations.
- WSU, through Healthy Urban Waters, has been devising analytical methods for characterization of fatbergs – large-scale sewer blockages – in the GLWA service territory. This work is funded by National Science Foundation (Miller: PI, Baker: Co-PI) and involves working with many community partners.

SIGNIFICANT INVESTMENTS in PILOT PLANT

- Student (undergraduate and masters) hourly wages for work in Pilot Plant (8 students): \$20,000
- Post-Doc recently hired: Dr. Adrian Vasquez (Started July 3, 2019).....I have encumbered \$85,000 for salary of Dr. Vasquez to Expand the Pilot Plant capabilities!
- Equipment purchased through WSU awards from:
 - National Science Foundation (Field Stations and Marine Laboratories Program - FSML) \$50,000
 - The Erb Family Foundation (Healthy Urban Waters) \$120,000
 - WSU - Office of the Vice-President for Research \$30,000

SIGNIFICANT COMMUNITY OUTREACH and EDUCATION

- Tours for Detroit Public School 6-12th grade (6 tours)
- Tours for Community Groups (such as Journalist Organization) (4 tours)
- Education of WSU students in Fluid Mechanics, Hydraulics, and W/WW Operations (Multiple Tours and Multiple Classes)
- Development of Public-Facing Water Quality Platform
- Development/Design of Fatberg Display and interactive gaming for Showcase at Michigan Science Center (Unveiling is September, 2019)