OCT 2025: YEAR 2, ISSUE 8

Water Quality Extension Newsletter

WHAT'S NEW

Photo by M.P. Hayes

UPCOMING EVENTS

OCTOBER

Wastewater Installers Course will be in Crowley for our 4th workshop

Extension Talk for the Landscape Nursery Workshop

NOVEMBER

Extension Talk for the Turf Grass Education Day

WAV Demo for Adopt-a-Pond in St. Tammany Parish

DECEMBER

Student writing course should yield more peer-review publications!

Let the water flow, and projects never slow!

Busy as ever, the lab is continuously bringing in new collaborations and multidisciplinary research ideas to translate into a wide range of stakeholders' audiences. The summer has opened the door for some unique collaborations and potential projects that will bring new perspectives to water issues in the state. A major theme for the lab over the last few years is providing a platform for students from diverse backgrounds to find avenues to apply their skills and learn from faculty experts. This semester, there are numerous undergraduate research projects and faculty extension activity outside of the "typical" water projects, but in Louisiana...most everything is connected to water! Get connected to the Water Quality Extension Lab homepage and stay tuned to the lab's upcoming extension series and peer-reviewed publications

LSU AgCenter Research · Extension · Teaching

Sea Grant LOUISIANA

Shristi's Masters Defense!

Congrats to Shristi on her successful thesis defense to secure her Master's! Her presentation titled, "Valorizing Seafood Waste Streams Using Black Soldier Fly Larvae: Implications for Sustainable Agriculture," highlighted her recent projects using shrimp and crab shells to create larvae and frass from insect rearing. Her projects have yielded multiple publications and conference presentations, while also providing valuable extension information for seafood processors. Part of Shristi's characterization work has involved the direct dissemination characterization of shells directly to the processors, while the research highlighted the beneficial use of the water stream for larvae feed stock or agricultural fertilizer amendments. Overall, the projects have yielded a rich dataset, which she will continue working with to finish out the semester. She becomes the Water Quality Extension Lab's first graduating student and fortunately, she plans to continue her PhD with the lab next semester, incorporating wastewater effluent into the valorization trials.

Photo by M.P. Hayes

Peer-Review Pub(s)

Due to the great work of students and collaboration teams, the lab was able to get its first, second, and... third peer-reviewed publications this last quarter. Two of the three publications were focused on the impact of the lab's experiential learning programs, leaning toward more application of the team's research and extension. The first, "Evaluating the Impact of University-Led Experiential Learning on Rural Development and Sustainable Manufacturing in Louisiana," was published in *Sustainability*, while "Assessing Place-Based Water Recommendations: A Case Study for University Experiential Learning Programs" was published in the *Journal of Contemporary Water Research and Education*. The third publication was a review prepared by Mysha Ahmed based on her current research project in waste adsorption. Her review, "Waste to Resource: A Review of Nutrient Removal from Agricultural Runoff using Recycled Byproducts," was published in the *Journal of Agriculture and Food Research*! The team is excited for additional publications that are currently in review. Please see the content section at the end of the newsletter or visit the lab's website for access to the full publication.

Unlocking Nitrogen Species for Water Quality

The lab is currently pursuing partial funding that could secure a TOC-L with a TN analyzer for the team. The lab's Gallery Discrete Analyzer is able to run the inorganic nitrogen species (nitrate, nitrite, and ammonium) for the total inorganic (or oxidizable) nitrogen (TIN). The aim is to secure the Shimadzu TOC-L for both organic carbon and the second unit for total nitrogen. This would allow for the nitrate and nitrite to be subtracted from the total nitrogen to get Total Kjeldahl Nitrogen (TKN). With these species, total organic nitrogen (TON) could also be calculated from the available nitrogen analysis. If you are interested in collaborations for nitrogen, please feel free to reach out to mhayes@agcenter.lsu.edu.

Wastewater Installers Demonstration Site


Photo by M.P. Hayes

In combination with the Louisiana Department of Health (LDH) Onsite Wastewater Installers Course, the lab is partnering with LSU AgCenter LaHouse and the Department of Civil and Environmental Engineering to develop a live demonstration site for individual septic system research and extension. The team is putting together a proposal to revamp the LaHouse demo units to become controlled, working systems that would provide leverage resources for funding opportunities and workshops. The system contains a secondary nitrogen treatment chamber that mimics a wider range of systems. The aim is to host residential, sanitarians, and state agent-based workshops to promote sustainable septic systems.

Multidisciplinary Golf Course BMP Validation Project

The lab is currently working with Eric DeBoer and TPC Louisiana on a project for current water recirculation and controlled fertilizer applications for turf. This unique multidisciplinary project was inspired by solidifying the sustainability steps golf courses take to prevent downstream water impairments. TPC Louisiana hosts a yearly PGA tournament and has been dedicated to building sustainable irrigation systems to reclaim lost nitrogen and conserve water for on-course usage. The lab has run surface water scans with the WAV and deployed a YSI EXO2 sonde for irrigation monitoring to develop a trend for water quality usage. The project will lead to the amplification of BMPs to larger audiences for implementation.


Photo by M.P. Hayes

Municipal Wastewater Treatment Visits


Photo by M.P. Hayes

This summer, LSU and Southern University students were able to visit the North and South Baton Rouge wastewater treatment facilities to learn about their processes. The experience was impactful as we were able to learn some of the limitations while seeing a unique algae trickle filter design. This treatment technique uses algae to treat effluent, which is sprayed over the units. A limitation is the production of freshwater snails, which becomes a nuisance in the system when they are flushed through. The lab did some preliminary analysis for the feasibility of the snail shells to determine a beneficial use for the waste material! The goal is to partner the facility with another group of stakeholders for shared valorization opportunities.

Waste Materials Capacity to Cleanup Crawfish Boil Water


Photo by M.P. Hayes

This research is a true Louisiana-inspired project focused on the remediation of salt from seasonal crawfish boils. Funded by the College of Agriculture Undergraduate Research Program, this project will characterize crawfish boil water and forecast eco-friendly treatment for disposal. The target is to provide homeowners with a valid means of reducing salt using sorption techniques. Current trials are seeking waste material high in starch, calcium, and magnesium to estimate salt removal. By using readily available waste materials, the lab looks to create a valorization loop to help alleviate non-hazardous waste issues and prevent environmental pollution during our favorite springtime event!

Fluorescent Fingerprint of Soil and Frass Matrices

Dissolved organic matter (DOM) is a part of every environmental system. The lab's fluorescent analyzers can provide indicators for parent source material based on signatures from the DOM in the sample. To help further understand the relationship of DOM entering Louisiana tributaries, the lab has started two projects: washing humic-rich soil and insect frass from previous seafood studies. The goal is to trace the dilution effect of organic matter exposed to elements while comparing the bioavailability of leached DOM. Humic standards from the International Humic Substances Society are being used for comparative fluorescent DOM values, while the insect frass provides a unique perspective on organic compost waste.

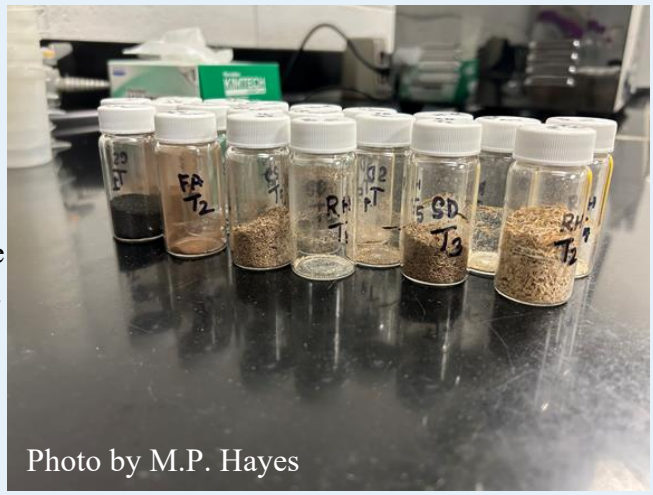
Photo by M.P. Hayes

Slow Release Coffee Ground Compost: Caffeine and fDOM Tracers


Photo by M.P. Hayes

Spent coffee grounds (SCG) are a composting staple for many homeowners, but little research has been dedicated to the release of compounds from SCG into the plant system. This undergraduate research project is setting up washing trials for SCG from various roasts to identify residual chemical signatures that are washed while mimicking saturation, similar to water home gardens or plants. The idea is to capture the residual caffeine system to identify additional stimulants in the environment, while also identifying the parent source fDOM fingerprint for various roasts. This will allow for future insight into the bioavailability of carbon source from composted SCG and the potential impact on surrounding ecosystems.

Water Analysis Vessel Demo

The WAV has been a great tool for water quality demos throughout the state, with a fun, engaging platform for teachers, students, and stakeholders! All summer, the team traveled to various events and showed off the capabilities of the boat as a readily available tool for water quality monitoring. Some of the visits included New Orleans Sewerage and Water Board for canal projects, a teacher professional development at Nicholls State University Research Farm, TPC Louisiana Golf Course, and Adopt-a-Pond in St. Tammany Parish. Depending on the audience, these events can be structured to promote science or showcase advanced technology for project implementation. While hosting the demonstration, participants can drive the WAV and get familiar with the system to determine feasibility for use. Additionally, in repeat settings, data can be collected while on-site and used for educational opportunities. In the future, the team is interested in designing living datasets from the videoed missions.


Photo by M.P. Hayes

Sustainability Case Studies

The lab has been putting together case studies to highlight our team's impact from the experiential learning trips. The generic case studies showcase a range of recommendations, including water savings, sustainable waste, and energy, at various types of manufacturers. Since 2023, the team has visited over 60 facilities, resulting in a calculated savings of $2,786,535 from post-visit surveys. The collaboration team has offered over 280 recommendations in this span and hosted the sustainability internships for 30 undergraduates (14 who have received Student Certification of Achievement for active participation in national experiential learning programs). The case studies function for two major purposes: 1) to help showcase the impact of recommendations to industries around the state to spark best management practices in water, waste, and energy; and 2) to serve as a template for extension agents who are interested in finding opportunities for stakeholders to save. The publications not only outline the recommendations, but also the resources, such as USDA REAP and DOE Implementation Grant funding, for stakeholders to implement projects.

Content Created

Peer-Reviewed Publications

Ahmed, M., and **Hayes, M.**, Waste to Resource: A Review of Nutrient Removal from Agricultural Runoff using Recycled Byproducts. *Journal of Agriculture and Food Research.* 2025.102371. **Journal Link**

Marcantel, M., Upadhyaya, S., Ahmed, M., and **Hayes, M.**, Assessing Place-Based Water Recommendations: A Case Study for University Experiential Learning Programs. *Journal of Contemporary Water Research & Education* - ACCEPTED IN PRESS

Ahmed, M., Ghafari, F., Pang, Z., Wang, C., Hayes, C., Shi, J, and **Hayes, M**. Evaluating the Impact of University-Led Experiential Learning on Rural Development and Sustainable Manufacturing in Louisiana. *Sustainability.* 2025. 17(17): 7642 **Journal Link**

Content Created (cont.)

Presentations and Demonstrations

Hayes, M., What is Agricultural Water Quality Research in Louisiana? Agricultural Residential College Seminar. Baton Rouge, LA. September 22, 2025

Hayes, M. BlueBoat Demonstration at St. Tammany Parish Adopt a Park Program. Fontainebleau State Park for Levi Morgan 7th Grade Ag Science. Mandeville, Louisiana. September 17, 2025

Marcantel, M., DeBoer, E., and **Hayes, M.** BlueBoat Demonstration at TPC Louisiana Golf Course. Avondale, Louisiana. July 28, 2025

Hayes, M. Water and Energy Nexus: Framework for Scalable Floating Photovoltaics Systems. Bayou Chapter of the Association of Energy Engineers. Baton Rouge, LA. July 22, 2025

Hayes, M. Water Quality Technology Adoption for Nursery and Landscape Operations: Sensor and Solar Demonstration. 2025 Hammond Research Station Horticulture Field Day. Hammond, LA. July 18, 2025

Wagner, N., Marcantel, M. and **Hayes, M.** BlueBoat Demonstration at Nicholls State University Teacher Professional Development Day. Thibodaux, Louisiana. July 7, 2025

Extension Publications

Hayes, M. Nuisance to Nutrients: Aquaculture Processors' Waste to Agricultural Fertilizers. Louisiana Agriculture. Summer 2025. Volume 68 Number 3 Page 20-21. **Article Link**

Hayes, M., Pond Buffer Zones to Improve Water Quality. Louisiana Nursery and Landscape. Summer 2025. Volume 91; Page 15 **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Meat Processor. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-F. **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Rice Mill. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-E. **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Lumber Mill. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-D. **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Fish Processor. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-C. **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Plant Nursery. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-B. **Article Link**

Hayes, M., Wang, C., and Zhihong, P., Sustainability Case Study: Louisiana Fish Farm. Fact Sheets. *Lead Author.* July 2025. Pub #P3987-A. **Article Link**

Hayes, M. Water Quality Extension Lab. LSU AgCenter Impact Statement. September 2025. Pub #: P4001-C. **Article Link**