JAN 2026: YEAR 3, ISSUE 9

Water Quality Extension Newsletter

WHAT'S NEW

Photo by M.P. Hayes

Let the water flow, and collaborations grow!

The year has already started with a few multidisciplinary and institutional grants that have been submitted, but the lab is looking forward to additional collaborations for the upcoming proposal. The most interesting part about the fluidity of the lab's research is the ability to collaborate on projects across various disciplines, from economics, engineering and agriculture. For the last few years, the lab has been building leverageable instrumentation and preliminary datasets, which are becoming foundations for a funding proposal. Additionally, the active involvement in multi-state groups has created strong working groups across many land- and sea-grant institutions. With a great cohort of faculty on campus and around the Gulf Coast region, the lab is looking to amplify our impact on stakeholders and grow interdisciplinary science through our academic networks.

UPCOMING EVENTS

JANUARY

The team is finalizing four more peer-review publications.

Grant funding on the horizon…stay tuned for positive updates.

FEBRUARY

Fingers crossed for deployments of sensors at a drinking water facility.

MARCH

Ninth Wastewater Installers Workshop will be offered at the Hammond Research Station, debuting new study materials.

LSU AgCenter
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Sea Grant
LOUISIANA

Lab's First Graduate(s)!

It has been a great first few years for the Water Quality Extension Lab, but it was made by the excellent students who call the lab home. Two of those students received their master's degrees at the graduation ceremony in December of last year. Shristi Upadhyaya and Mason Marcantel have both completed their projects and are planning two separate pathways post-graduation. Shristi will be continuing in the lab for her Ph.D., where she will work with the chemical characterization of insect frass as a value-added fertilizer. This will build on her master's thesis titled, "Valorizing Seafood Waste Streams Using Black Soldier Fly Larvae: Implications for Sustainable Agriculture." Mason will be entering the real world to pursue a career in environmental consulting. Over the last two years, he has built a strong resume in water quality sensing, digital precision, and agrivoltaics-based projects, contributing to his thesis, "Establishing a Framework for Sustainable Practices in Water Quality Through the Integration of Technology and Remote Sensing."


Photo by Biplov Sapkota

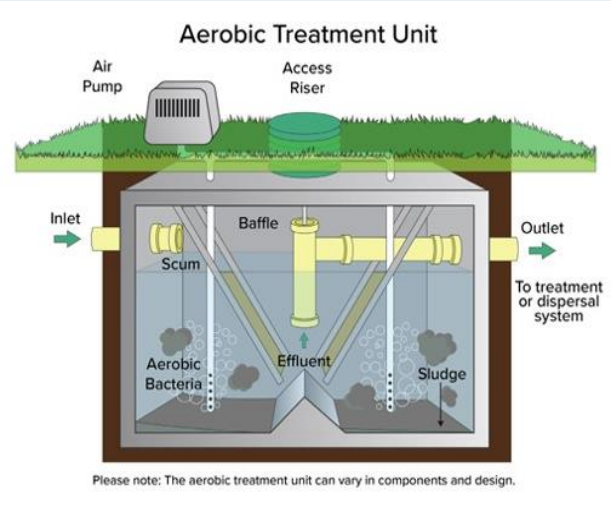
Think Downstream

The Think Downstream Series has been a growing request for K-12 educational events in the last few semesters. Currently posted on the website are parameter fact sheets for dissolved oxygen, Fecal coliform, nitrogen, pesticides, pH, salinity and temperature. Many agents have reached out with teacher requests for additional parameters to build projects or hands-on opportunities for students. In the next few months, the team will add metals, phosphorus, algae, turbidity, total suspended solids, total dissolved solids, color and sulfate to the list of parameters. These fact sheets provide a basic description of water quality parameters, ecosystem impact, potential sources and mitigation techniques to increase public knowledge. You can check out the fact sheets on the lab's website under the Extension Publications tab to see if they can be used in your area for events, workshops or lecture materials. If there are other parameters that you would like to see added to the list, please let the lab know so we can put together a template. We are always excited to add compounds of interest and are currently exploring anthropogenic chemicals to include in the next rounds of submissions.

Water Quality Resiliency Indexing as Qualitative Tool

The lab is currently building out a platform to design community and industrial water quality resiliency indexes. This tool would be modeled after the NOAA and Sea Grant Community Resiliency Index (CRI) to better understand the needs of communities in the face of disasters. The goal is to investigate knowledge thresholds for drinking water, wastewater treatment and downstream environmental impacts to promote stewardship and best management practice implementation. The two different versions will focus on the specific needs of communities and industries for sustainable water quality. If you are interested in collaborations for this indexing in your area, please feel free to reach out to mhayes@agcenter.lsu.edu.

Septic Series Factsheets Published for Installers and Homeowners



In partnership with the Louisiana Department of Health (LDH), the lab has created a 20-part series of fact sheets for wastewater installers and residential homeowners. The first set of factsheets serves as the operational guide for the state's sanitarians, based on the Louisiana Administrative Code (LAC) Title 51, Part XIII. It will be the study materials for the Wastewater Installers Workshop course and quick review documents when installers are on site. A separate set of fact sheets was designed for residential homeowners to better understand their system by explaining various impacts for effluent, preparing units for storm events and demonstrating preventive maintenance tips.

National Platform for Wastewater Treatment Extension

The National Rural Water Association (NRWA) is a non-profit organization that focuses on training and promoting education to water professionals who serve small towns around the United States. Recently, the team published an article titled, "Correlating Water Quality Parameters in Municipal Waste Stabilization Ponds using Sensor Networks," in their Rural Water magazine. Wastewater stabilization ponds rely on detention time and mechanical oxygenation to process organic materials. The goal was to showcase general trends in water quality for waste stabilization ponds and promote the use of sensor technology to determine the impact on water processing. The study revealed that conductivity, temperature and pH were essential indicators for pond efficiency.


Photo by M.P. Hayes

Promoting Louisiana Sea Grant Research and Extension

Over the last few months, Dr. Jeff Plumlee and I were asked to help the *Louisiana Agriculture* magazine editorial staff put together a joint article for Louisiana Sea Grant research and extension. The result was an extremely impactful magazine showcasing a few of the various projects the agents and specialists have going on in their regions. The Sea Grant agents are spread around the coastal parishes and have diverse backgrounds for projects ranging from K-12 education to fisherman safety workshops. This was such a great experience to work with Kyle Peveto and his team to promote the great work for Sea Grant and LSU AgCenter to the coastal parishes. Check out the Volume 68, Number 4, Fall 2025 Issue to see some of the great articles.

EPA Pollution Prevention Funding for Chemical Reduction


Photo by M.P. Hayes

It was a long time in the making, but the lab was officially awarded our EPA Pollution Prevention Grant for Food and Agricultural Rural Manufacturers (P2 PARM) Program. This grant will allow teams of undergraduates to visit diverse food and agricultural facilities around the state as part of the experiential learning program experience. The team will provide technical assistance while exploring a new area of research for water quality indexing at facilities. A large focus of the grant is on alternative chemicals through EPA's Safer Choice-Certified Products and identifying parameters that the partners are interested in monitoring at their facility to craft a future sustainability plan.

Elemental Metal Tracing for Seafood-Based Insect Frass

The project funded by the LSU AgCenter Program for the Center of Excellence for Crop Enhancement grant has yielded a wealth of data from the shrimp and crab shell trials over the last year. From the initial analysis and quantitative results of the greenhouse study, the team is exploring metal concentrations in the frass and how they change in the larvae with various feed blends. The frass has shown promise as a source for elemental metals, and seafood blends support increasing amounts of calcium, aluminum, zinc, iron and manganese in both the larvae and frass. The goal of the study is to determine the percent accumulation in the frass and the threshold for intake of metals in the larvae as a feedstock source. Stay tuned for more publications in the spring.


Photo by M.P. Hayes

Wastewater Treatment Peer-Reviewed Publications


Photo by M.P. Hayes

Since the conclusion of the wastewater stabilization study at the Gonzales municipal facility, the team has partnered with Dr. Mahathir Bappy to model water quality data and produce advanced trends in parameters for an optimized system. Through this partnership, the collaboration team has produced three peer-reviewed publications in *Water Research*, *Water* and *Applied Water Science*, promoting the use of sensor technology and modeling of water parameters in rural systems. Not only has the data been used for high-caliber research, but the initial study findings have been disseminated to facility personnel to drive operational changes at various times of the year. Be on the lookout for more great data set interpretations for our two labs in the near future.

Recap of Final Talks of 2025

The busy season kicked off with a seminar for the College of Coast and Environment to promote integration of technology for seasonal water quality dynamics in wastewater treatment ponds. It was a great turnout and an opportunity to chat with students about the importance of validating field sensors. Pivoting from wastewater treatment, the team did the bulk of our talks in the world of the water and energy nexus. From Alexandria for the Landscape Professional Education Day to Hammond's LNLA Irrigation Recertification Workshop, and even the LSU and SU Ag Research Summit, the lab presented on data findings from the floating solar projects and opportunities for renewable energy in agriculture. Finally, hosting some general water quality sessions at events like LSU AgCenter Turfgrass Education Day, Louisiana CCA Soil, Water and Nutrient Management Program and Sea Grant Advisory Council Meeting helps promote the focus of our team's work, which is unlocking practical solutions to persistent water quality issues around the state.

Photo by M.P. Hayes

EMS 3010 Student Project

During the spring semester, the lab will host its second EMS 3010 student to work on a typical project for the lab. The project will focus more on database design for alternative compounds in manufacturing facilities. One of the disadvantages of making sustainable changes in industrial operations is the uncertainty of cost, or the time spent investigating the economic ripple of changing practices. The student in EMS 3010 will build a database for Safer Choice-Certified Products to help alleviate the burden on facilities interested in exploring alternative compounds. The database will be used while the experiential team is on-site to show sustainable sourced compounds and offer recommendations with more accurate cost estimations. The EMS 3010 student will not only build the database, but also participate in a site visit for hands-on field work, and design case studies around prevalent compounds like cleaners to show the feasibility of implementing alternative chemicals. Send us an email if you are affiliated with any stakeholders interested in seeing alternative compounds for their operation.

Content Created

Peer-Reviewed Publications

Martinez, J., Islam, M., Marcantel, M., **Hayes, M.**, and Bappy, M., Interpretable Forecasting of Dissolved Oxygen Using a Foundation Model for Proactive Aeration in Rural Wastewater Treatment. *Water Research*. 2025. 124931. **Journal Link**

Marcantel, M., Bappy, M., and **Hayes, M**. Investigating Seasonal Water Quality Dynamics in Humid, Subtropical Waste Stabilization Ponds. *Water*. 2025, 17(20), 2936. **Journal Link**

Martinez, J., Islam, M., **Hayes, M.**, and Bappy, M, AI-Enabled Modeling for Smart Rural Wastewater Treatment Systems: Current Practices and Remaining Gaps. *Applied Water Science* – Accepted (In-Press)

Content Created (cont.)

Presentations and Demonstrations

Hayes, M., Agrivoltaics and Water Quality Session. LSU and Southern AgResearch Summit. Baton Rouge, LA. Dec. 16, 2025

Hayes, M., Nexus of Irrigation, Energy, and Water Quality. LNLA Irrigation Recertification Workshop. Hammond, LA. Dec. 4, 2025

Hayes, M., Developing an Appreciation for Water Stewardship by Understanding Louisiana Agricultural Connectivity. Louisiana CCA Soil, Water and Nutrient Management Program. Alexandria, LA. Nov. 18, 2025

Hayes, M., Connecting Communities through Water Resources. Sea Grant Advisory Council Meeting. Baton Rouge, LA. Nov. 17, 2025

Hayes, M., Water Quality Impact on Industry and Community. LSU AgCenter Turfgrass Education Day. West Monroe, LA. Nov. 7, 2025

Hayes, M., Integration of Technology to Investigate Seasonal Water Quality Dynamics in Waste Stabilization Ponds. College of Coast and Environment Seminar Series. Baton Rouge, LA. Oct. 25, 2025

Hayes, M., The Water and Energy Nexus: A Framework for Sustainable Agriculture. Landscape Professional Education Day. Alexandria, LA. Oct. 2, 2025

Extension Publications

Hayes, M., Correlating Water Quality Parameters in Municipal Waste Stabilization Ponds using Sensor Networks. National Rural Water Association. Fourth Quarter 2025. Volume 46; Number 4. Page 28. **Article Link**

Hayes, M., Water and Energy Nexus: Floating Solar Panel Review. Fall 2025. Volume 92; Page 27 **Article Link**

Gambill, H and **Hayes, M.** Bayou Lafourche Drinking Water Project. Louisiana Agriculture. Fall 2025. Volume 68 Number 4 Page 28-29. **Article Link**

Hayes, M. Digital Precision Water Technology for Crawfish Research and Extension. Louisiana Agriculture. Fall 2025. Volume 68 Number 4 Page 32-33. **Article Link**

Plumlee, J and **Hayes, M.** Louisiana Sea Grant Research and Extension Review. Louisiana Agriculture. Fall 2025. Volume 68 Number 4 Page 18-21. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Conventional Septic Systems Explained! Fact Sheets. *Lead Author.* November 2025. Pub #P3986-A. **Article Link**

Hayes, M., Grabert, R., and Guient, P., What types of wastewater do you generate? Fact Sheets. *Lead Author.* November 2025. Pub #P3986-B. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Effluent Reduction Guidelines: Alternative Treatment Techniques Fact Sheets. November 2025. Pub #P3986-C. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Sanitation Guide for Limited Use Septic Systems: Houseboats and Fishing Camps. Fact Sheets. *Lead Author.* November 2025. Pub #P3986-D. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Navigating Floods and Power Outages for Septic Systems. Fact Sheets. *Lead Author.* November 2025. Pub #P3986-E. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Preventative Maintenance Tips and Warning Signs of Septic Issues for Homeowners Fact Sheets. *Lead Author.* November 2025. Pub #P3986-F. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Aerobic Treatment Units Explained! Fact Sheets. *Lead Author.* November 2025. Pub #P3985-K. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Definitions. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-A. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Oxidation Ponds. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-B. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Sand Filters. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-C. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Rock-Plant Filter. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-D. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Spray Irrigation. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-E. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Alternative Method: Overland Flow, Mound Drip, or Subsurface Drip. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-F. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Pit Privy and Limited Use. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-G. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Pumping Stations. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-H. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Chlorinators. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-I. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Effluent Reduction Fields. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-J. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Aerobic Treatment Units (ATU). Fact Sheets. *Lead Author.* November 2025. Pub #P3986-G. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Conventional Septic Systems. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-L. **Article Link**

Hayes, M., Grabert, R., and Guient, P., Onsite Wastewater Installers: Absorption Trenches. Fact Sheets. *Lead Author.* November 2025. Pub #P3985-M. **Article Link**