

WHAT'S NEW

EXTENSION – PAGE 3

The introduction of two experiential learning opportunities for students and rural communities! (Page 3)

RESEARCH – PAGE 4

Grant funding has been acquired for a multidisciplinary water and energy project (Page 4)

TEACHING – PAGE 5

ANR Agent Training lecture on *Identifying the sources of agricultural water quality for Louisiana communities* (Page 5)

UPCOMING EVENTS

JANUARY

First graduate students for the water quality extension lab will be joining

Water Quality Extension Program website will be going live

FEBRUARY

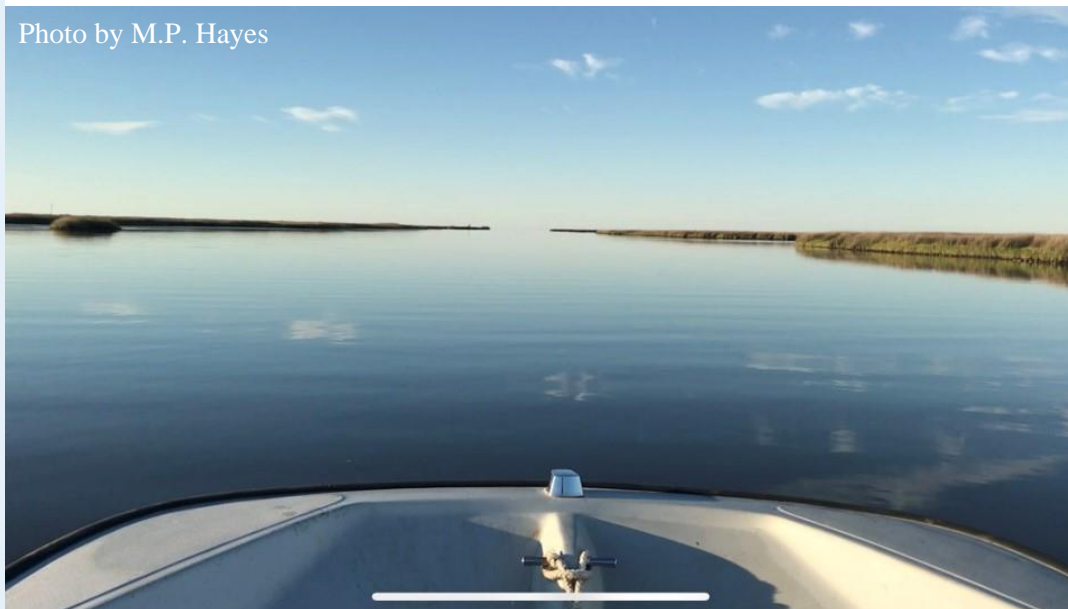
Two research projects with rural wastewater treatment facilities will get kicked off

MARCH

First Wastewater Installers Workshop will be offered and LSU AgMagic will feature water quality booth

Water Quality Extension Newsletter

Photo by M.P. Hayes



Let the water flow, and community grow!

The focus of our lab is to provide avenues of extension and environmental research for water quality issues around the state! Our team approaches a variety of water quality topics ranging from agricultural to coastal and everywhere in between. Louisiana's diverse landscape of industry, infrastructure, and environment offers a dynamic opportunity to explore critical topics in water-related issues while prioritizing community education through extension work and global discovery with our innovative research. Check out our latest extension content and research topics to immerse yourself in Louisiana's vast water resources!



New Graduate Students

The Water Quality Extension Lab (WQEL) is excited to have three new graduate students joining the team. Mysha Ahmed will be a Ph.D. candidate with a research focus on utilizing non-hazardous industrial waste as biosorbent materials to manage nutrient runoff from agricultural farms. She joins the team with a Master's in Agricultural Chemistry from Bangladesh Agricultural University. Mason Marcantel will be a Master's candidate with a research focus on optimizing water quality metrics of rural wastewater treatment facilities utilizing deployable sensors. His previous position as a student contractor was with the USGS Wetland and Aquatic Research Center. Shristi Upadhyaya will also be a Master's candidate with a research focus on the characterization of aquaculture processors' wastewater effluent for land-applied fertilizer use. Her undergraduate research from Agriculture and Forestry University, Nepal explored the bioconversion of waste into nutrient-rich fertilizer and protein ingredients. Photo taken by Mysha Ahmed.



Website Goes Live!

The WQEL just went live with a new website for stakeholders, collaborators, and students to find useful and relevant information. The new website can be found at the URL provided below. As the extension program grows and the students become more involved with their research, the website will be populated with extension articles, factsheets, journal publications, and extension videos that will be geared toward persistent water quality issues in the state. In the meantime, the website offers access for stakeholders to browse the experiential learning programs that offer water quality assessments for facilities/farms and the current research projects for Dr. Hayes' lab to see relevant overlap with their day-to-day operations. Stay up to date with the lab's recent events and watch the website quickly populate the extension tab with useful publications and videos tailored to our state's water quality needs! If you have any website feedback or are interested in collaborating on a water quality extension publication, please email mhayes@agcenter.lsu.edu.

<https://faculty.lsu.edu/hayes/index.php>

Instrument Collaborations with Faculty

Dr. Hayes' background in analytical instrument analysis provides the foundation for water quality sampling and testing through his lab. Once installed in early January, the WQEL will have instrument capabilities that include Thermo Scientific Gallery Discrete Analyzer for aqueous photometric (colorimetric and enzymatic) analysis and Shimadzu Nexera HPLC with SPD-40 and RF-20AXS detectors for analyte method development. The WQEL will gladly collaborate with faculty on projects that overlap analysis capabilities. Stay tuned for newsletters outlining new methods created on instruments in Dr. Hayes' lab.

USDA and EPA Extension Funding to Engage Student, Stakeholders, and Faculty Expertise

Two extension funding opportunities have been awarded to Dr. Hayes and the WQEL for experiential learning programs that engage stakeholders with students and faculty for water-related recommendations. The USDA Renewable Energy for America Program (REAP) grant was awarded a one-year to establish the framework for a water and energy conservation program to help rural farming communities and aquaculture processors understand their resource footprint. Dr. Hayes led the grant in collaboration with LSU Engineering to engage students in field assessments to broaden the reach of their classroom learning in both environmental management systems and engineering disciplines. The major objectives of this year's funding are to provide assessments for eight rural stakeholders, produce extension material for water conservation recommendations, and establish the framework for continued funding through USDA REAP. The team had a successful first site visit to Chris and Camille Family Farms in early December. The urban farm specializes in microgreen and leafy vegetable production. Photo taken by Shelby Schexnaydre (Entergy Solutions).



Additionally, Dr. Hayes collaborated with Southern University as a co-PI for EPA's Pollution Prevention Environmental Justice in Communities Grant. This two-year award (starting March 2024) provides opportunities to expand urban manufacturing industries' knowledge of their water footprint and recommendations for more sustainable practices. The grant opens the door for collaborations with Southern University AgCenter students in the LSU WQEL to perform water quality assessments on basic parameters using analytical instrumentation. The final objectives of this grant will produce water conservation best

Sustainability Recommendations for Aquaculture Processors

In Fall 2023, Dr. Hayes had the opportunity to work with a variety of aquaculture processors on sustainability recommendations at their processing facilities. These initial assessments set up a long-term partnership for extension and research opportunities with the WQEL. The site visits to Pontchartrain Blue Crab, Louisiana Newpack Shrimp, and Daybrook Fisheries provided an opportunity to see water and waste streams created by the processors to identify best practices and potential avenues for economic benefit. Recommendations at these facilities ranged from wastewater protein recovery using small-scale dissolved air floatation to partnerships with local recycling companies to compost solid waste materials. A past recommendation in solid waste recycling partnered a large acreage plant nursery with a shrimp processor to utilize shrimp shells as a secondary fertilizer source. The recommendation had an implementation cost of \$8,070 for transport and logistics with an estimated savings of \$91,930 for the nursery (reducing fertilizer purchases) and a reduced solid waste disposal cost for the shrimp processors. The goal for sustainability recommendations is to create templates for other facilities to view and implement to reduce their water and waste footprint in their communities. Projects in water reclamation and reuse are a targeted strategy for high-volume water processors as the WQEL grows. The lab plans to continue outreach to aquaculture processors to develop sustainability recommendations and establish partnership roots. Thank you to the Louisiana Sea Grant Agents (Carol, Mark, and Thu) for introducing our team to processors in your areas!

Areas of Interest for Water Quality Extension Lab

With a wide range of water quality issues in the state, Dr. Hayes' initial research interest and funding strategy revolve around topics including: 1) wastewater effluent characterization from aquaculture processors to quantify nutrient and amino acid profiles; 2) nutrient runoff and retention from agricultural farms using waste as biosorbent materials; and 3) water quality and energy optimization using remote sensing for rural wastewater treatment ponds. Partnerships from Dr. Hayes' previous affiliated program have provided a foundation for industrial participation and pilot study sites for research to be conducted. By partnering with industrial facilities around the state, the WQEL plans to generate relevant preliminary data for current issues plaguing rural communities and leverage for future funding opportunities.

\$500,000 for Two-Year Water Quality and Energy Optimization Research with Rural Wastewater Treatment Facilities



Photos by M.P. Hayes. Site pictures from Gonzales waste stabilization ponds for floating solar deployment

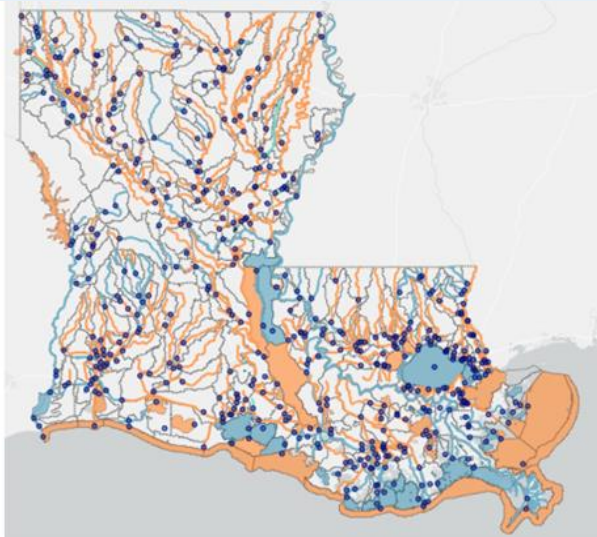
Louisiana offers a unique intersection between industry, environment, and infrastructure that drives a progressive culture of environmental sustainability and resiliency for both manufacturers and rural communities. Dr. Hayes' research focuses on the application of floating photovoltaics (FPV) to non-economic water bodies around the state including municipal wastewater treatment ponds, industrial oxidations ponds, and agricultural irrigation ponds. Though land-based photovoltaic (LPV) is a highly studied area with many benefits including energy independence, long-term savings, and decreases in non-renewable resources, it also has many challenges such as land constraints, permanent infrastructure to host panels, and environmental/economic impact in selected regions. The ever-changing dynamic of Louisiana's landscape due to hurricanes, subsidence, and land loss provides an opportunity for a novel approach to energy through FPV. Though FPV has an estimated higher cost and negative impact on recreational space, the benefits of increased efficiency from water cooling, decreased evaporation for the water body, reduced maintenance cost, and true "deployable" nature with no permanent structure provide optimistic application potential for Louisiana agricultural communities without sacrificing valuable land space. This pilot research will take place at a rural waste stabilization pond for a one-year study of water quality parameters and energy efficiency. Dr. Hayes' team will monitor YSI EXO2 deployable sensors for metrics including ammonium, nitrates, temperature, dissolved oxygen, and pH to see the effect of FPV shading on the conversion of nutrients in the wastewater system. The potential benefits of FPV on water quality include a sunlight barrier to reduce evaporation, stabilizing the temperature for microbial activity, and reducing algae production decreasing maintenance and chemical additives. This research will demonstrate the benefits of FPV for agricultural water quality metrics and the potential energy footprint from agricultural ponds in the state.

ANR Agent Training Lecture

The Hammond Research Station hosted the new ANR Agent Training in December with a focus on Water. Dr. Hayes was invited to give a lecture on "Identifying the sources of agricultural water quality for Louisiana communities". The presentation overlapped available state and university resources to apply practical solutions to persistent water quality issues. The Louisiana Department of Environmental Quality (DEQ) [Water Quality Integrated Report](#) was used to identify case studies on major non-point source pollution in agriculture around the state. The pollutants were broken down to the chemical level to help establish indicators and the environmental impact. University extension publications outlining best management practices (BMPs) were then applied to each case study to show available resources and the first steps to be taken in the areas. Agents were provided a pathway to better understand their area's water quality issues and get a head start on navigating BMPs.

Non-Point Source Pollution

1. Nutrients (N & P)
2. Sediments
3. Pesticides
4. Animal Feed Operations
5. Livestock Grazing
6. Irrigation



Onsite Wastewater Installers Workshop

In collaboration with the Louisiana Department of Health (LDH), Dr. Hayes will be teaching the wastewater installers workshop to educate installers, haulers, sub-manufacturers, and manufacturers of wastewater systems on proper treatment techniques for sewage to prevent untreated or improperly treated sewage from being discharged into the environment. This course will be offered quarterly in four locations throughout the year. In Louisiana, 41% of impaired waterways are polluted with fecal coliform or enterococcus from septic or animal waste. This problem is prevalent in residential, industrial, and agricultural settings. By working with LDH to teach this certification course, the WQEL plans to disseminate the content to different platforms that will engage with a variety of audiences on the septic problem in Louisiana. The bulk of this extension will be done in parishes identified by the Louisiana DEQ as hot spots for septic issues: St. Tammany, Livingston, Ascension, Assumption, Lafourche, Terrebonne, and Calcasieu.

Content Created

Hayes, M., Timmerman, A., Kirk-Ballard, H., Rainwater Harvesting for Small Nurseries and Home Gardens. 2023. Extension Article. Online: [Rainwater Harvesting for Small Nurseries and Home Gardens \(lsuagcenter.com\)](#)

Hayes, M., 2023. LSU AgCenter's Newly Funded Water and Energy Conservation Program for Agricultural Businesses. Louisiana Nursery and Landscape. Winter 2023.