

WHAT'S NEW

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Water Quality Education from
Hammond to Lockport (Page 3)

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Waste and Wastewater Research
Findings (Page 4)

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EMS 4040 Update and New Approach
to Stewardship (Page 5)

UPCOMING EVENTS

APRIL

Floating Solar Panel Webinar for
Institute of Energy Innovation

Wrapping up Nick's crawfish pond
surveys for LSU Discovery

MAY

Wastewater Installers Course will be in
Alexandria for our 2nd workshop

JUNE

The lab will be inundated with
undergraduate summer research!

First conference for the graduate
students!

Water Quality Extension Newsletter



Photo by M.P. Hayes

Let the water flow, and winter season...snow

Temperatures in Louisiana plummeted during January for a record snow week that posed many new water quality phenomena. The Water Quality Extension Lab was actively monitoring water parameters at a local wastewater treatment facility and saw water temperatures in the pond decrease to 9C in response to the cold weather. The initial project has been modeling pond health through key parameters including nitrate, ammonium, and dissolved oxygen. The rapid decrease in temperature caused a dramatic shift in pond processing, but provided some exciting new information on nutrient conversion during extreme weather events!



COA Undergrad Funding

Congratulations to Ruth Nolan for receiving funding for the *Chemical Characterization of Crawfish Boil Water for Environmentally-Friendly Treatment and Disposal* from the LSU College of Agriculture Undergraduate Research Program. Her project seeks to explore creative ways to clean up a quintessential Louisiana pastime. The project will use LSU service labs to quantify the salt content of boiled water and look for sorbent materials (bagasse, rice husk, grass clippings, etc.) to uptake high saline solutions. The data will be used to create an extension publication for best practices in disposing of crawfish boil water and formulating the perfect second batch by characterizing salt concentrations! With a background in chemistry, Ruth is interested in expanding her instrumental skills to provide valuable information for environmental conservation. This funding from LSU will help her also build a foundation for future graduate fellowship opportunities and long-term goals of utilizing her chemistry background to give back to the agricultural community.



Photo by M.P. Hayes

Gulf Scholar Student

The lab is excited to host Gulf Scholars undergraduate research this summer from the LSU Discover Program. Jalayne Allison is a rising senior majoring in anthropology at LSU. Her career focus is addressing the impacts of persistent issues on people and cultures. Jalayne expressed interest in learning about the relationship between water quality and people through community immersion. The project she will be working on is in connection with Enamul's current research which determines the parent source material of dissolved organic matter in aquatic systems. Jalayne will be working with different environmental samples including Mississippi River, creek, and runoff trials to characterize the parent source material, thus giving the samples a molecular fingerprint. The project will allow the team to trace organic matter through different systems and correlate with nutrient loads in the samples. With a variety of samples to analyze, it will provide a unique understanding of terrestrial and aquatic organic decomposition in Louisiana tributaries. The goal is to get Jalayne into the field to see how organic matter traces through tributaries and provide ideas for her future career path linking environmental events and people.

Dreaming of High-Caliber Analytical Instrumentation

With the addition of the new Horiba Aqualog fluorescence analyzer, the Water Quality Extension Lab focuses on securing the final funding for a Shimadzu SPARQ program. This program helps provide high-caliber analytical instrumentation for faculty use and training from Shimadzu scientists for graduate students on method development. The overall goal is to acquire instruments that faculty can leverage on future grants and promote multi-disciplinary collaborations. The two instruments that have been quoted are LCMS-8060NX and GCMS-TQ8050. If these instruments would be useful for your research, please email mhayes@agcenter.lsu.edu for more information.

Bayou Lafourche Drinking Water Projects

Such a great way to start the year with a team of faculty taking a tour down Bayou Lafourche to discuss the impact of water on the four southern parishes: Ascension, Assumption, Terrebonne, and Lafourche. Haley Gambill connected the Water Quality Extension Lab with Dustin Rabalais from Bayou Lafourche Fresh Water District (BLFWD) to start the journey. A full team including Haley, Dustin, Craig Gautreaux, Mason Marcantel (graduate student), Dr. M.P. Hayes, Dr. Mahathir Bappy (LSU Industrial Engineering), and Dr. Peng Fu (SPESS) took the trip from the start of the bayou, all the way down to Lockport's drinking water facility to see how it is controlled, travels, and is processed to get residents clean drinking water. From this trip there are many exciting projects emerging for both extension and research. In collaboration with Craig and LSU AgCenter Communication, the BLFWD is looking to create a video series with the Water Quality Extension Lab to promote Bayou stewardship and a community understanding of the intensive process of making drinking water for over 300,000 residents. Additionally, the LSU faculty team is on the lookout for funding opportunities to establish a water quality sensor network down the bayou to create a predictive tool for drinking water production based on surface water parameters. Be on the lookout for more updates about this partnership in the near future!



Photo by M.P. Hayes

Landscape Education Day at Hammond Research Station



Photo by Damon Abdi

The Water Quality Extension Lab had a great time out at the Hammond Research Station during Landscape Education Day. On one of the many trips to the station this quarter, the lab presented on Using Technology to Determine Water Quality Impact on Pond Health to educate nursery farmers and landscape specialists on opportunities to incorporate technology into their everyday operations. The focal point of the talk was to determine what water metrics needed to be tested and build out the technology from there. For instance, nursery growers may have an interest in the salinity of irrigation

water, so a simple electrical conductivity meter can be used to associate EC with salinity (even easier with the Louisiana Salinity Field Reference for Agriculture). In other cases, a landscape specialist may want to determine the impact of nutrient runoff into a pond by looking at the dissolved oxygen, thus needing a YSI or Hanna Instruments multiparameter handheld. The talk highlighted the various types of sensors out there for water quality usage and showcased the best ways to balance sending samples off for analysis versus doing them in the field. After the brief lectures, Dr. Abdi took everyone for a tour around the station and explored all the faculty's research projects. The Water Quality Extension Lab showed two of our current projects: floating solar panels for agricultural water conservation and the BlueBoat water drone for water quality mapping (pictured). One of the most critical elements of adopting technology is the ability to put it in perspective, which is a value of these demonstration-based projects. Overall, it was a great event and with the number of questions asked and answered, it seemed to be well received by the community.

Phosphate Sorption to Non-Hazardous Industrial Waste

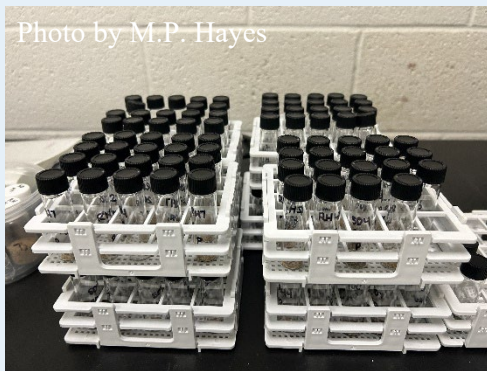


Photo by M.P. Hayes

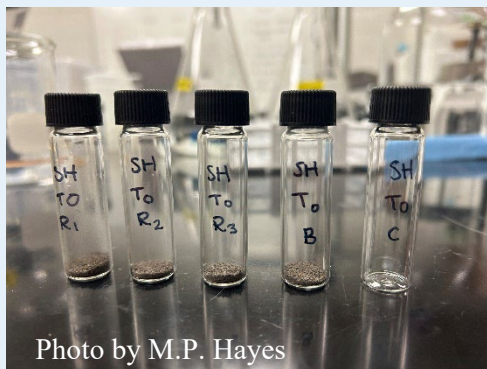


Photo by M.P. Hayes

The water quality lab is currently conducting multiple isotherm experiments with various non-hazardous industrial wastes to determine phosphate binding potential on the surface or particle pore space. The design of these microscale isotherms eliminates microbial activity and promotes chemical binding through aggregation. The goal of the project is to understand the potential loading capacity of waste material as the edge of crop solution for runoff. Mysha has been working over the last few months to determine the optimal waste-solution ratio to maximize the sorption potential of phosphorus. She recently completed her first full adsorption experiment which eight sets of samples that shake for 72 hours. These samples are taken off at different times to correlate phosphate absorption with time. In the recent trial, it was seen that shale material absorbed 60% of phosphorus in solution after 24 hours. This trial will continue into the desorption series which will stimulate the removal of phosphorus to mimic natural washing. At the conclusion, Mysha will take the optimized absorption and desorption times for the final isotherm, which varies the concentration to see the loading potential on the waste streams. Currently, the lab is conducting isotherm using shale, casting sand, fly ash, wood chips, and other cellulose-based waste products.

Louisiana Extreme Fluctuations in Wastewater Treatment Pond

After an atypical winter, the team has started looking into extreme weather fluctuations (specifically temperature) in wastewater treatment ponds. Recently, Mason gave a seminar titled, *"Optimization of Biological Nitrogen Removal in Rural Wastewater Treatment Through Climate Abnormalities: Gonzales, LA"* which showcased correlations in standard pond variables with changes in extreme events. In the wastewater treatment ponds that the team is testing the typical inflow trend shows strong positive correlations of dissolved oxygen, temperature, and ammonium, while nitrate is more negatively correlated. When shifting to outflow, the ammonium processing is less dependent on dissolved oxygen because of the lower concentrations and thus does not correlate. This would be the typical findings at any pond throughout the year. During the January snowstorm, the sondes recorded water temperatures of 9 Celsius causing abnormal trends in water parameters. The most evident was the negative correlation between dissolved oxygen and temperature in the inflow, and the positive correlation of dissolved oxygen, tempura, and ammonium in the outflow. This extremely low-temperature event showed a decrease in microbial activity in the beginning stages of the pond, which led to more processing being needed at the outflow side. This "delay" in processing is supported by microbial response to cold water. To contrast this data, Mason pulled summer 2024 data where the water temperature was over 30 Celsius. For the peak heat event, the most notable correlations were temperate, dissolved oxygen, and nitrate (instead of ammonium). This is explained by warmer temperatures aiding in the cycling of ammonium and promoting more processing of nitrate in a pond setting, especially in the outflow. With this dataset being produced from the ponds, the team is partnering with faculty from LSU Industrial Engineering to model the pond systems for proactive adjustments in pond aeration scheduling and chemical processing to create more sustainable wastewater treatment practices.

EMS 4040: Midterm Report

The EMS 4040: Environmental Instrumental Analysis course is through midterms and it has been a fun, new experience to learn how to teach in the traditional format. The course is structured through a lecture/lab-based format. The first half was focused primarily on sample collection, preparation, processing, and in-situ remote analysis. Utilizing past collaborations, the students were able to hear guest lectures from Emelia Marshall (The Water Institute), Megan Arias (Xylem Inc.), and Rachael Mathews (Louisiana DEQ). These guest speakers reinforce topics including preparation during fieldwork, advanced remote sensor application for agriculture/water, and the impact of validation and chain-of-command for environment samples in the state sector. The most important things these speakers shared were the experience transitioning from their degree pathways to the real world and potential skills that would benefit students when they start applying for positions. The remainder of the course will be dedicated to benchtop analytical instrumentation hosted out of the Water Quality Extension Lab. Through the lab portion of the class, students have had the opportunity to see precision instrumentation for environmental sampling. Additionally, remaining guest lectures and class trips include: Dr. Billy DeLany (Delta Land Service), Dr. Havalend Steinmuller (LUMCON), Dr. Fabrizio Donnarumma (LSU Chemistry), and trips to LSU AgCenter's AGGRC Lab and the LSU Oceanography Wetland Biogeochemistry Analysis Service Lab. The guest lectures are open to any undergraduate or graduate student in the SPESS network. For more information on the remaining guest lectures, email mahyes@agcenter.lsu.edu to get the dates and locations.

Appreciation of Stewardship Talk

Early this quarter, the AgLeadership Development Program, led by Dr. Soileau, asked for a guest lecture focused on water quality. This was a unique opportunity to interact with a range of stakeholders on various topics that affect their industries. For this lecture, there was a new emphasis on an appreciation for stewardship from our agricultural leaders. Everyone strives to be a steward of the environment, but why? The challenge presented to these leaders was to understand the impact of a water impairment. This could be on the immediate surroundings ecosystem, tangential farming operations, or even downstream communities. For example, tributary water from mid-Louisiana makes it down to south Louisiana where crawfish farmers use surface water to flood their fields. Water is a conduit throughout the state and maintains connectivity for rural communities. The message was stewardship is more than just protecting the environment, it's making the best choices to preserve the shared natural resources flowing through Louisiana communities.

Content Created

Presentations

Hayes, M. Available Resources to Navigate Water Quality and Fishing. Louisiana Sea Grant Fisheries Summit. Slidell, LA. March 25, 2025

Hayes, M. Using Technology to Determine Water Quality Impact on Pond Health. Landscape Education Day. Hammond, LA. February 27, 2025

Hayes, M. Fate of Pesticides in Louisiana Waterways. Pesticide Certification Training: Hammond Research Station. Hammond, LA. February 20, 2025

Content Created (cont.)

Presentations

Hayes, M., Connectivity of Louisiana Tributaries: Developing an Appreciation for Stewardship. Louisiana Agricultural Center Leadership Program. Thibodaux, LA. February 11, 2025

Hayes, M., Water Quality and Turfgrass. Louisiana Turfgrass Association Meeting. Baton Rouge, LA. January 9, 2025

Extension Publications

Hayes, M., Water Movement: Subsurface vs. Surface Pond Oxygenation. Louisiana Nursery and Landscape. Spring 2025. Volume 90

Other Mass Media

Getting water to your home no easy task by Craig Gautreaux. Various Local News Network and LSU AgCenter Digital Website. February 6th, 2025. Interviewed. Online