

From the Director's Desk ...

Mississippi State University is planning for both in-person and online courses for fall semester beginning August 17. A shortened semester will end November 25. MWRRI is pressing ahead with research projects funded by USDA-ARS as well as USGS.

Dr. Jason Barrett offers courses for certification and professional credit. The schedule of courses can be found on the www.wrri.msstate.edu website. A description is available as is registration. Should you have questions, please don't hesitate to contact Dr. Barrett by phone 662-325-1788 or jason.barrett@msstate.edu.



We do not as of yet have any more information about 2021 MWRC. Submitted and accepted abstracts can be reviewed on the institute's website. As soon as more information becomes available, it will be made public on the website as well as through the listserv.

This month's featured researcher is Dr. John Ramirez-Avila. Dr. Ramirez-Avila is an Assistant Research Professor in the Civil and Environmental Engineering Department at Mississippi State University. Further in this newsletter is more information about his research.

If anyone would like to share how their agency research projects are progressing during the COVID-19 pandemic, please email your information to Jessie Schmidt for sharing, jessie.schmidt@msstate.edu.

Jason

Jason Krutz, Ph.D.

From the desk of Dr. Barrett

As I write this, Hurricane Sally has made landfall. It is amazing at the number of hurricanes we typically see in a year. In the wake of each hurricane, depending on the severity, we may be addressing minimal repairs, or we may be looking to replace entire neighborhoods/towns. Also affected by the devastation of hurricanes is the drinking water supply. Regardless if someone is on a private home well or a community water system, there will likely be the need for preventative measures before the hurricane or restoration measures after.

At the Institute, we are continually providing technical assistance to private well owners, public water systems, and public and private wastewater systems in Mississippi. Our next round of trainings and workshops are for private well owners. You can access our flyers, press release, registration, and publications at <http://msuext.ms/mswon>. The upcoming water sample screenings and virtual workshops will be in Marshall County (samples - September 22 / workshop September 24), Harrison County (samples - October 20 / virtual workshop - October 22), Tate County (samples - November 10 / virtual workshop - November 12), Wayne County (samples - November 17 / virtual workshop - November 19), and we will finish the year with Lowndes County (samples - December 1 / virtual workshop - December 3). Please visit our website for more information.

We are in the beginning stages of our Lead Testing in Schools and Childcare program named "SipSafe". We are getting the groundwork prepared and look to be in the field in the fall so stay tuned.

If we at MSU Extension or Mississippi Water Resources Research Institute can be of any assistance, please give us a call or check our website for upcoming events/trainings.

Thanks so much,



John J. Ramirez-Avila

Assistant Research Professor
Watersheds and Water Quality Research Lab
Civil and Environmental Engineering Department
Mississippi State University

**Tell us a little about your background and your current position.**

I am currently an Assistant Professor in the Civil and Environmental Engineering (CEE) Department at Mississippi State University (MSU) since 2016. I am originally from Colombia and live in Mississippi since 2007 when I was accepted to advance my PhD in Engineering at the CEE Department in MSU. My doctoral research focused on the assessment and prediction of streambank erosion processes and was completed in 2011. Then I worked as Postdoctoral Associate with the Geosystems Research Institute (GRI) until 2014, when I became Assistant Research Professor at the CEE Department.

Before graduating as Agricultural Engineer from the Universidad Nacional de Colombia in 1999, I was a Researcher in Formation at the Colombian Corporation of Agricultural Research (Corpoica) for 2 years. My study focused on the evaluation of water management in irrigation districts. After graduation, promoted as Researcher, I focused on the assessment and modeling of soil erosion and productivity losses in highly degraded soils.

A new phase of my personal and professional life started in 2002, when I became a graduate student pursuing a Master degree in Soil Sciences at the University of Puerto Rico (UPR) in Mayagüez. I advanced the quantification and management of sediment and nutrients in runoff at plot, field and watershed scale under natural and simulated rainfall. Simultaneously, I became an Earth Team Volunteer for the Natural Resources Conservation Service (NRCS), which offered me great support and guidance for the completion of my research. I graduated in 2005 and worked as Research Associate at the UPR studying runoff quality and implementing best management practices (BMPs).



Watersheds and Water Quality Research Lab Team (left) core sampling for sediment oxygen demand analysis (right)

What are your current research activities and interests?

I have pursued research in the area of Environmental and Water Resources Engineering, with a focus on channel evolution and watershed modeling, stream processes and restoration, and stormwater management and pollutant reduction. In 2016, we established the Watersheds and Water Quality Research Lab (WWQRL) at the CEE Department as a research group with opportunities of participation for undergraduate and graduate students in projects mostly focused on these subjects.

The evaluation and selection of appropriate applicable modeling tools is one of the strategies for designing, siting and assessing potential sediment and nutrient reductions from multiple management practices implemented in Mississippi. Supported by USDA-NRCS, USDA-ARS and MWRRI, we advance research to assess and improve the ability of existing modeling tools to improve cost-effectiveness of investment in conservation practices, and enhance stakeholder's ability to make appropriate resource conservation decisions, supported by the use of such tools.

Success of stream restoration projects depends upon understanding physical, chemical, and biological constraints on developing stream communities and ecosystems. Supported by MWRRI and by the Stream Restoration Working Group of the MSU Bagley College of Engineering (BCoE), we advance research on understanding fundamental mechanisms that govern stream processes and functions, and stream responses to natural and human disturbances. Supported by the USEPA, additional work aims to provide validated tools that help practitioners and regulatory agencies in the design, evaluation and implementation of more effective restoration projects in Mississippi.

Stormwater management and pollutant reduction are related subjects that operate under continuous development of management and design methods, and refinement and change of public policies. The Catalpa Creek Watershed is an experimental lab in which we advance hydrologic, hydraulic and ecological watershed assessment, targeting the implementation of the Water Resources Management Plan evaluated and approved by MDEQ and EPA in 2016. These efforts are supported by the CEE Department, the Healthy Watersheds Working Group of the BCoE and USDA-ARS.



Temporal variation of in-stream processes along a Catalpa Creek tributary

How does the Water Resources Research Institute fit into your future plans? How can we help you be successful?

MWRRI has been very supportive for our research and I am very thankful for it. When I started as Assistant Professor in 2016, our WWQRL awarded two USGS 104g grants, one I led as PI to assess and predict in-stream processes in the Catalpa Creek Watershed, and a second focused on the applied use of unmanned aerial vehicles in surface water quality protection, led by Dr. Joby Czarnecki from GRI. Currently, and since 2018, our team advances two doctoral studies, one on watershed modeling and the second one on pollutant reduction, both funded by the USDA-ARS and supported by MWRRI. Through this support we have been able to advance work and expand my research interests in collaboration with many other researchers from MSU, USDA-ARS and other universities. I will look to MWRRI to keep expanding my research interests, keep searching for research funding opportunities and an important source of divulgation of our studies results through the annual conference and probably even the Newsletter or other venues.



In my favorite office (left) performing habitat assessment and macroinvertebrates sampling (center) and stream reconnaissance (right)

Funded Research Projects

USDA-ARS funded research projects include:

1. Long-term Agro-ecosystem Sustainability Research Common Experiment awarded to Dr. Jason Krutz and Dr. Drew Gholson, Assistant Professor, Delta Research and Extension Center, Stoneville, MS
2. Examining Sustainable Production Systems to Improve Water Resources in the Lower Mississippi River Basin to Dr. Jason Krutz, Dr. Drew Gholson, Dr. Beth Baker, Assistant Extension Professor, FWRC-Wildlife, Fisheries & Aquaculture, and Dr. Tsz Him (Himmy) Lo, Assistant Extension/Research Professor, Delta Research and Extension Center, Stoneville, MS.
3. Integrating Cover Crops, Tillage, and irrigation Management to Enhance Crop Productivity, Profitability and Profitability to Dr. Jason Krutz.

Submitted Proposals

To USGS – 104g program

1. Effect of Soil Heterogeneity and Altered Hydroperiod on Oxbow-Wetland Tree Health, Soil Redox, and Groundwater Recharge from Dr. Gregg Davidson, Chair and Professor, Geology and Geological Engineering, University of Mississippi,
2. Evaluation of Native Wetland Plant Species for Nutrient Mitigation in Restored and Managed Wetlands of the Lower Mississippi River Basin from Dr. Gary Ervin, Professor, Biological Sciences,

Mississippi State University and Gray Turnage, Research Associate, Geosystems Research Institute, Mississippi State University.

To NRCS

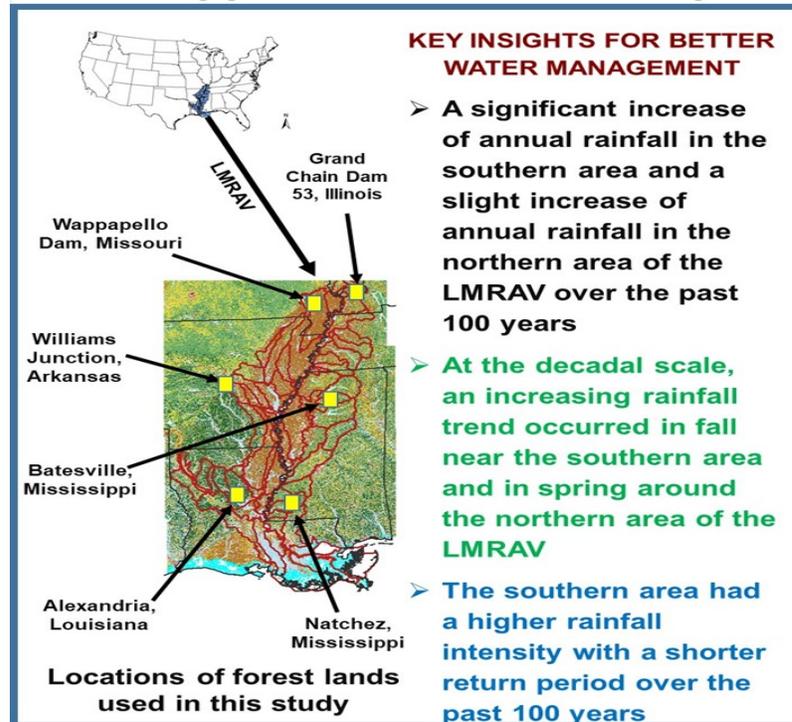
Autonomous Irrigation of Cover-Crop-Production Systems Reduces Pollutant Loss from Farm Fields, Transport of Agrochemicals in Streams, and Aquifer Decline from Dr. Jason Krutz, Dr. Drew Gholson, Dr. Erick Larson, Extension/Research Professor, Plant and Soil Sciences, Dr. J. Trent Irby, Associate Extension Professor, Plant and Soil Sciences, Dr. Gurbir Singh, Assistant Research Professor, Delta Research and Extension Center, and Dr. Brian Mills, Assistant Professor, Delta Research and Extension Center.

Researcher Publications

Dr. Ying Ouyang of UADA-FS and others have recently published their research findings in Scientific Reports (www.nature.com/scientificreports). The research is about a 100-year rainfall trend in forest lands of the Lower Mississippi River Alluvial Valley (LMRAV) and the article can be found at <https://doi.org/10.1038/s41598-020-69508-8>.

The LMRAV is important for crop and forest production in the mid-south US, which is prone to cyclic flooding from extreme rainfalls and, within the last 30 years, is known for groundwater level decline due to well pumpages for crop irrigation. Variations in long-term rainfall trends create concerns about droughts, floods, water quantity, and ecosystem services in agricultural and forest lands. Identification of long-term rainfall trends is important for water resource management, water supply planning, environmental protection, and managing other ecological services on these lands. Using 100 years of daily rainfall data from six discrete forestlands throughout the LMRAV along with multivariate statistical analysis, the authors found a significantly increasing trend of annual rainfall near the southern area, and only a marginally increasing trend of annual rainfall in the northern area. At a decadal scale, an increasing rainfall trend occurred in fall near the southern coastal area and in spring around the northern inland area of the LMRAV. The coastal area became wetter and experienced a higher rainfall intensity with a shorter return period over the past 100 years.

A century of precipitation trends in forest lands of the Lower Mississippi River Alluvial Valley



Upcoming Events

- USGS 104b RFP for 2021-2022 funding is expected November 2020. Stay tuned for details.
- The 2021 Mississippi Water Resources Conference will be held sometime in 2021 spring. More details can be found at www.wrri.msstate.edu.

Do you have a publication that you would like to share? Consider distribution through the MWRRI newsletter. Contact Jessie Schmidt for information.

Do you have an upcoming event that all those interested in water-related issues and agriculture would find interesting? Considering adding it to the newsletter and/or listserv. Also available is the MWRRI Twitter account - @MS_WRRI.

About the Mississippi Water Resources Research Institute (MWRRI)

The institute exists as both a federal and a state research unit. Established in 1964, the MWRRI is one of 54 institutes (one in each state, The District of Columbia, Guam, Puerto Rico, and the Virgin Islands) that form a national network to solve water problems of state, regional, or national significance. In 1983, the Mississippi legislature formally designated the MWRRI as a state research institute. Federal funds designated for the institute are used to consult with state water officials to develop coordinated research, technology transfer and training programs that apply academic expertise to water and related land-use problems. These various activities are funded through an annual grant from the United States Geological Survey (USGS). Mississippi state appropriations provide additional funds for cost share. The institute also assists state agencies in the development of a state water management plan, maintaining a technology transfer program, and serves as a liaison between Mississippi and federal funding agencies.

Discrimination based upon race, ethnicity, religion, gender, national origin, age, disability, or veteran's status is a violation of federal and state law and MSU policy and will not be tolerated. Discrimination based upon sexual orientation or group affiliation is a violation of MSU policy and will not be tolerated.



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