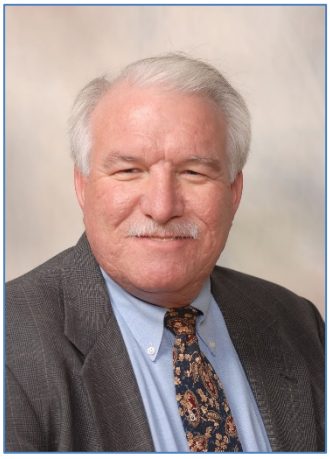
MWRRI Newsletter

MWRRI Newsletter Spring 2016

From the Director's Desk …



Last month's statewide water resources conference, hosted by MWRRI, affirmed continued interest in water resources research and management in Mississippi evidenced by continued increases in participants, students, poster presentations, and sponsors. I'd like to especially thank our event sponsors: Farm Bureau Federation of Mississippi, Mississippi Department of Environmental Quality, MSU Division of Agriculture, Forestry, and Veterinary Medicine, MSU Extension Service, Pickering Firm, Weyerhaeuser, Inc., and the U.S. Geological Survey. I am also very appreciative of the work of MWRRI's staff and the session coordinators who volunteered to organize and facilitate the numerous topical conference sessions. The information provided by our plenary speakers was very helpful for us to understand the scope and scale of many of the water resource management challenges that we face in Mississippi and how these challenges are being addressed at the state and federal level.

Recently, MWRRI was notified by EPA of its desire to fund two proposal submissions that support the activities of the Hypoxia Task Force, a multi-state and federal agency organization. The proposals, prepared in collaboration with MSU's Social Science Research Center, extend our services throughout the entire Mississippi/Ohio River Watershed. The proposals address the water resource management–social science nexus which our Advisory Board affirmed as a research priority last year.

Our watershed management activities continue to move forward with the recent development and submission of the *Implementation Plan for the Red Bud–Catalpa Creek Watershed Phase 1.* We continue to be very excited about the potential of this effort and the establishment of a Watershed DREAMS (Demonstration, Research, Education, Application, Management and Sustainability) Center at MSU.

These activities are discussed in more detail in this newsletter in addition to a profile of one of MWRRI's collaborating researchers, Dr. Gnaneswar Gude.

Together we can make a difference,

Bill

Bill Herndon

2016 Mississippi Water Resources Conference

April 5-6, 2016

The annual Mississippi Water Resources Conference, hosted by MWRRI, was held at the Jackson Hilton on April 5-6, 2016. Over 150 pre-registered to attend the conference – a 20% increase over 2015 – and numerous participants registered onsite. Student participation also increased significantly.

Researchers and students from colleges and universities as well as water resources planners, managers, and policy-makers from state and federal agencies, industry, and other backgrounds presented 54 oral presentations on the following topics:

- Water Treatment/Management
- Delta Water Resources I and II (2 sessions)
- Water Quality I and II (2 sessions)
- Outputs and Outcomes
- Tools and Models
- Agricultural Water Management
- Mississippi Water Resources
- Ecology/Hydrology I and II (2 sessions)
- Water Use
- Collaborative Initiatives
- Policy/Planning

Patricia Wilson, Jessie Schmidt

Additionally, 22 posters were presented.

Mike McCormick

The opening plenary speaker was Marc Wyatt, Director of the Office of Oil Spill Restoration with Mississippi Department of Environmental Quality (MDEQ). Marc spoke about the RESTORE Act and the Gulf Coast Restoration Plan, and provided an update on planning and implementation activities. The lunch plenary speaker on Tuesday, April 5, was Chris Wells, Chief of Staff of MDEQ. Chris spoke about MDEQ's priorities including Delta groundwater declines, development of numeric nutrient criteria, 303(d) List of Impaired Waters, as well as potential budgeting impacts to the agency. Wednesday's lunch speaker was Mike McCormick, President of Mississippi Farm Bureau Federation. Mr. McCormick discussed Farm Bureau's role in water resources, including its statewide and national perspective of the Waters of the United States (WOTUS) issue.

Through sponsorship of Weyerhauser, a student oral presentation competition was re-instated during this year's conference. Also, an anonymous gift in honor of Mr. James R. Kilgore III, sponsored the continuation of the student poster competition. Of the 30 students registered for the conference, 27 gave either oral or poster presentations. Cash prizes of $100 for 1st place, $75 for 2nd place, and $50 for 3rd place were awarded to the winners in both categories.

Winners of the student poster presentation competition were:

1st place Emily Mealins, MSU – Potential Solutions for Dealing with High Iron Content in Filter Backwash Water of a Municipal Water Treatment System

2nd place Julianna N. Stratton, MSU – Multidisciplinary Remediation: An Analysis of Chlorinated Metabolites in Groundwater Contaminated by Pentachlorophenol Following 15 Years of Air/Biosparging, Phyto-remediation, and In-situ Chemical Oxidation Protocols.

3rd place Tadesse Sinshaw, UM – Prioritizing the Restorability of Impaired Water Bodies: A Case Study of Four Watersheds in the Delta Region of Mississippi

Julianna Stratton, Tadesse Sinshaw

Winners of the student oral presentation competition were:

1st place Cory Shoemaker, MSU – Effects of Land Use on Wetland Plant Diversity in Mississippi

2nd place Juan Pérez-Gutiérrez, MSU – Towards an Improved Understanding of On-Farm Water Storage Systems in Mississippi: How Much Water is Lost from These Systems?

3rd place Xiaojing Ni, MSU – Evaluation of Crop Rotation and BMPs on Water Quality and Quantity using SWAT

Xiaojing Ni

Welcome Reception

Lunch Plenary

Bill Herndon, Greg Bohach

All presenters are asked to submit a full paper by July 1, 2016 for publication in *The Proceedings*. The publication will be released Fall 2016.

Special thanks to the following sponsors, exhibitors, and/or organizers whose assistance ensured the success of the conference:

- Eureka Water Probes
- MS Department of Environmental Quality
- Mississippi Farm Bureau Federation
- Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine
- Mississippi State University Extension Service
- Mississippi Water Resoources Research Institute
- Pickering Firm, Inc.
- Ramboll Environ
- U.S. Geological Survey
- Weyerhauser Company and
- Yazoo-Mississippi Delta Levee Board.

Also, a special thank you to all of our technical session facilitators/coordinators who identified and solicited speakers for their sessions. Finally, all the successes of our conference were a product of the long hours and hard work of Ms. Jessie Schmidt, Coordinator of MWRRI and Mr. Richard Ingram, MWRRI's Associate Director. Assisting Jessie during the conference was Ms. Patricia Wilson who helped at the registration desk and setting up breaks, meals, and etc. THANK YOU Jessie Patricia, and Richard!

MWRRI to Receive Funding for 2 Proposal Submissions

During December 2015, MWRRI submitted two funding proposals in support of a multi-state research and extension organization, SERA-46, which was established through the Mississippi River/Gulf of Mexico Watershed Nutrient (Hypoxia) Task Force. The two proposals *Using Social Indicators to Guide, Evaluate, and Accelerate Implementation of State-Level Nutrient Reduction Strategies* and *Using Civic Engagement Indicators to Assess and Encourage Non-Government Stewardship of State-Level Nutrient Reduction Strategies* were submitted in response to a U.S. EPA Request for Proposals. This RFP targeted National Priority Activity III: Gulf of Mexico Hypoxia and Agricultural Nutrient Issues Outreach and Technical Assistance. Recently, MWRRI was notified of EPA's desire to fund both proposals. Co-Principal Investigators for the projects include Mississippi State University's Social Science Research Center, the University of Wisconsin–Madison's Department of Urban & Regional Planning and Extension, and the University of Minnesota's Center for Changing Landscapes. The two projects represent Phases 1 and 2 of a four phase effort to advance the implementation and sustainability of nutrient reduction strategies developed by the twelve states that are members of the Task Force.

Water quality problems that have accumulated over many decades may take decades to correct. This is the case when considering the complexity, scale, causes, and impacts of Gulf of Mexico hypoxia. Social indicators provide consistent measures of social change and can be used by planners and managers at the national, state, and local levels to estimate the impacts of their nutrient reduction efforts and resources even while a lag exists for monitored improvements in water and habitat quality. Additionally, social indicators can inform planners and managers of changes needed to their nutrient reduction strategies to increase the effectiveness of their efforts.

Civic engagement indicators focus on a policy emphasis shift to long-term sustainability and engagement of civic society. Whereas social indicators measure changes in stakeholder knowledge, beliefs, and behavior, civic engagement benchmarks assess the capacity among watershed stakeholders of all categories to assume a longer-term stewardship responsibility. For policy makers and resource agencies who must constantly allocate scarce resources for short-term projects, civic engagement measures can provide metrics useful in determining where and how benefits could be sustained from the use of those scarce resources.

MWRRI Submits Watershed Implementation Plan

During April 2016, MWRRI submitted an *Implementation Plan for the Red Bud–Catalpa Creek Watershed Phase 1* to the Mississippi Department of Environmental Quality. The plan was developed by numerous contributors from Mississippi State University's Agricultural and Forestry Experiment Station; Department of Animal and Dairy Sciences; Department of Fisheries, Wildlife, and Aquaculture; Department of Civil and Environmental Engineering; Department of Landscape Architecture; Extension Service; Geosystems Research Institute; REACH (Research and Education to Advance Conservation and Habitat) Program, Mississippi Water Resources Research Institute as well as staff from the Mississippi Department of Environmental Quality, Mississippi Soil & Water Conservation Commission, and USDA's Natural Resources Conservation Service.

The Phase 1 implementation plan builds upon the comprehensive *Water Resources Management Plan for the Red Bud–Catalpa Creek Watershed* developed collaboratively by 18 University units during 2015. This plan describes specific water quality and habitat restoration activities recommended for the headwaters of the Red Bud–Catalpa Creek Watershed in the proximity of MSU's H.H. Leveck Animal Research Center (South Farm). The comprehensive plan calls for the installation of 23 best management practices (BMPs) in three delineated critical management areas, details an information and education program, describes a monitoring program to quantify the effectiveness of the installed BMPs, establishes an implementation schedule with measurable milestones and project outcomes, and contains a detailed budget. Phase 1 also lays the groundwork for the development of a Phase 2 implementation plan for the entire watershed.

Researcher Profile: Dr. Veera Gnaneswar Gude

Assistant Professor, Department of Civil & Environmental Engineering, Mississippi State University

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

I have a B.S. in Chemical Engineering from Osmania University (India) and M.S. and Ph.D. in Environmental Engineering from the National University of Singapore (Singapore) and New Mexico State University (NMSU, USA) respectively. I became a faculty member at Mississippi State in January 2012. I believe that my background covering both chemical and environmental engineering principles, enriched with industrial and research experience, has laid a strong foundation for viewing the environmental pollution issues from a new perspective and developing solutions through integrated and innovative approaches. I worked for Du Pont Singapore as process engineer and Cascade EcoSolutions in Seattle as senior research engineer, before and after my doctoral studies, respectively. My doctoral research focused on developing a low temperature desalination process operating under natural vacuum. My research abilities further expanded into other technical areas including water and waste water treatment and biofuel production as I received other professional appointments. My passion for teaching has grown stronger since graduate school at NMSU and through the tenure-track faculty positions held with the Oregon Institute of Technology and MSU. Continuing my research on low temperature desalination, I have given workshops, training sessions and presentations in Boulder, Colorado at the World Renewable Energy Forum (WREF); Tampa, Florida for the Department of Energy; Doha, Qatar; Amman, Jordan; Abu Dhabi, UAE; and at the ASES 2013-2015 national conferences on desalination, biofuels and the water-energy nexus.

What are your current research activities?

My MSU position has provided me exciting opportunities to explore into microbial desalination and biofuel research areas. Some of my recent research projects focused on utilizing algae photosynthetic species, as source for biofuel production and waste water treatment through microbial desalination. Developing green chemistry and sustainable processes combined with process intensification by microwave and/or ultrasound irradiation for biofuel production and understanding the feasibility of current and emerging technologies for removing the emerging contaminants such as PPCPs (pharmaceutical and personal care products) and EDCs (endocrine disruptors) in

wastewater were focal points of some of my other research efforts. Collaboration with the Department of Landscape Architecture resulted in projects that develop green infrastructure and treatment techniques for storm water management. Other research efforts include chitosan and ultrasound enhanced water treatment and development of chitosan-graphene based novel membranes for removing hazardous chemicals and substances from industrial wastewater. With a passion to help rural and disadvantaged communities, my current research focuses on waste water treatment and water quality management issues in small communities of the Mississippi coastal region. Through this project, I am working in sensitive watersheds such as Jourdan River Watershed. Another project investigates the feasibility of novel photovoltaic technology and a multi-effect design of low temperature desalination unit for rural and coastal communities around the world.

Research conducted with our students has received appreciation from scientific communities around the world as evidenced by numerous awards and recognitions. This would not have been possible without the support from many individuals at MSU. I thank the colleagues in my department and collaborators in the Department of Chemical Engineering, Department of Chemistry, and U.S. Department of Agriculture.

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

I am very grateful to the Water Resources Research Institute for funding our research on waste water management in small, rural and disadvantaged communities. The experienced and knowledgeable staff at MWRRI has always been very helpful in many ways, identifying research opportunities and bringing together research teams to collaborate on research projects. The annual water research conference is instrumental in updating and providing exciting opportunities for our graduate and undergraduate students. This event creates an excellent professional network opportunity for our students to engage with representatives from the private sector and governmental agencies.

I also benefitted as a graduate student from the New Mexico Water Resources Research Institute through several research grants and annual conferences while at New Mexico State University, and I hope that our graduate and undergraduate students from all relevant disciplines at MSU will also realize this opportunity to develop their professional career in the water industry. I am very thankful to my advisors for their support and my graduate and undergraduate research students for their outstanding contributions in my time here at MSU and previous institutions.

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.

If you or someone that you know would like to receive this publication please email jessie.schmidt@msstate.edu to be added to the MWRRI listserv.