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The newsletter of the

OKLAHOMA
WATER RESOURCES CENTER

Inside this issue:

The National Weather Service Arkansas-Red Basin River Forecast Center 2

OSU Researcher Talks Water and Sustainability 3

World Water Day Celebration at OSU 4

Student Section 5

Faculty Spotlight: Dr. Sergio Abit 6

Drought Is Everyone's Concern 7

New & Noteworthy 8

Contact Info and Social Media Links 8

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Oklahoma Water Resources Center

From the Director's Desk (by Justin Moss)

It has been an exciting and fun experience serving as the Interim Director of the Oklahoma Water Resources Center for the past three months. It was a pleasure to work with Dr. Garey Fox in the transition period and I appreciate the outstanding work he did during his time as Director. Dr. Fox left the Oklahoma Water Resources Center in excellent shape and started many great programs such as the Student Water Conference and the Berry Fellows Program. Mrs. Leslie Elmore has been critical in helping to make a smooth transition and keeping everything moving forward and running efficiently.

In addition to being the Interim Director, I'm currently an Associate Professor and holder of the Huffine Endowed Professorship in the Department of Horticulture and Landscape Architecture. I focus on urban landscape water and environmental issues. I am also a member of the bermudagrass development team (headed by Dr. Yanqi Wu), which is currently working to test and

select cultivars that have excellent production value and show better drought resistance and freeze tolerance than commercial standards. My extension program focuses on outdoor water conservation. I have worked with the City of Oklahoma City and the City of Edmond to develop and implement water conservation programming.

In February I attended the **National Institutes for Water Resources** annual meeting in Washington DC. This meeting brought together the directors of each state water institute to discuss important water resource issues. We received updates about current federal funding and the current continuing resolution for the federal government budget process, which has put FY 2017 USGS 104b research projects on hold.

While in DC I took time to visit our senators and representatives and educate them on the impact of our work. My visits with the Oklahoma delegation went well and all seemed to be excited to hear the impact of the water related re-



Dr. Justin Moss with Senator James Lankford

search conducted by our faculty. Many of these projects are supported with funding from the USGS through the 104b and 104g programs, as well as the Berry Professorship and DASNR funding.

I look forward to the next few months of activity as I continue to serve OSU, the Division, and our wonderful faculty, staff, and students in the Oklahoma Water Resources Center. In the meantime, if there is anything I can do to assist and serve you, please let me know.

THAT'S A WRAB: Introducing the People and Organizations Composing Our Water Research Advisory Board

The National Weather Service Arkansas-Red Basin River Forecast Center

(by Bekki Harjo, NWS-NOAA, Arkansas-Red River Basin Forecast Center)

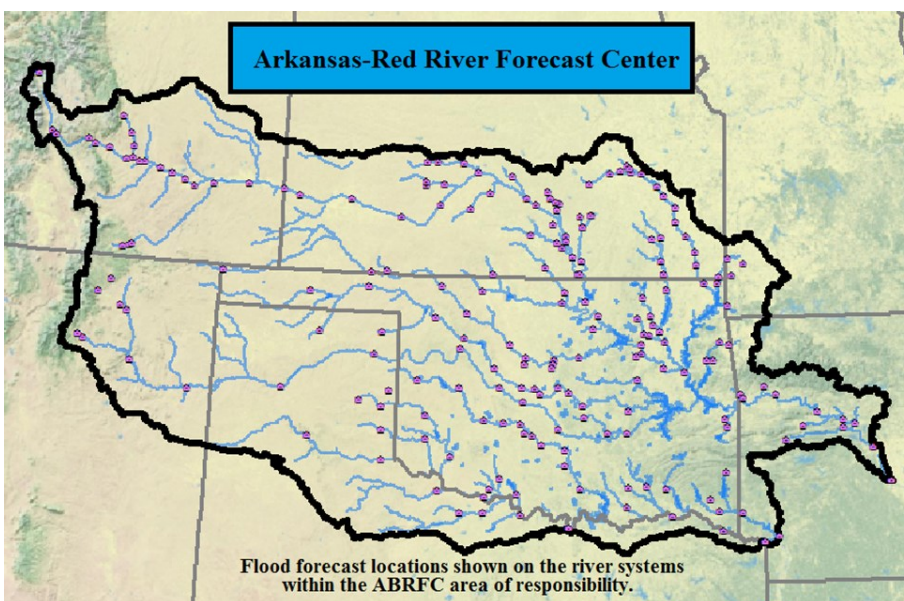
Each of the rivers in Oklahoma is like a friend with its own personality. Some are flashy. Some are a little slower to react. I have worked in federal water resources involving reservoir operations and river systems for the past seven years. My family says that I love to chase raindrops! As a hydrologist at the National Weather Service's Arkansas-

Red Basin River Forecast Center (ABRFC), I get the opportunity to count raindrops and chase them downstream.

ABRFC is a regional NWS office located in Tulsa that provides water-related forecasts, outlooks, and guidance products for an area of 211,415 square miles. We cover the Arkansas River basin from its headwaters near Leadville, CO down to Pine Bluff, AR. On the Red River, we cover the headwaters in New Mexico down to Fulton, AR. We work closely with the U.S. Army Corps of Engineers (USACE) and the U.S. Geological Survey (USGS) and other national, state, and local agencies.

ABRFC forecasters can issue daily or flood-only forecasts at over 200 river locations, along with providing quality controlled meteorological and hydrologic data, seasonal forecasts, flood outlooks, and drought summaries. The NWS considers our office to be the gold standard in precipitation data!

Our deterministic river forecasts are our bread-and-butter products. ABRFC typically uses 18 hours of future rainfall the river in or river forecasts from 15 March through 14 October. During the cooler winter months, we use 30 hours of forecasted rainfall. Because many people need to know the potential impacts on river systems based on different amounts of quantitative precipitation forecast (QPF), ABRFC also provides ensemble forecasts using probabilistic QPF. We currently provide an ensemble interface that allows users to interactively select the number of hours of QPF and see the resulting effects on the river hydrograph (river stage over time). We recently also started producing probabilistic



river forecasts that attempt to adjust for known meteorological and hydrologic biases.

All sorts of people in the public—homeowners, farmers, ranchers, businesses, emergency managers—use our river forecasts to determine what actions they need to take to protect lives and property. Water managers use our forecasts to help determine

reservoir releases. Agencies and universities use our precipitation data for studies. Since our gridded precipitation data is shown on the Oklahoma Mesonet website, many people might be using our data without even knowing it!

When I'm not at work, I let my inner hippie out. I love being outdoors with my family as much as possible, whether it be hiking, camping, or even working in the yard. I also enjoy practicing acupuncture, cooking, and crafting with my husband Quanah and our kids, Nathaniel and Kiva Gene.



OSU Researcher Talks Water and Sustainability

(by Emily E. Horton, Communications Student Worker, Oklahoma Water Resources Center)

Oklahoma State University’s Science Café is a monthly event in which scientists present current research to students, faculty and the public. This event allows participants to discuss research and ideas with each other as well as with the guest scientist.

Dave Lampert, assistant professor in the School of Civil and Environmental Engineering, gave a presentation titled “21st Century Sustainability: Water Research in Relation to Energy and Food” at the January 2017 event.

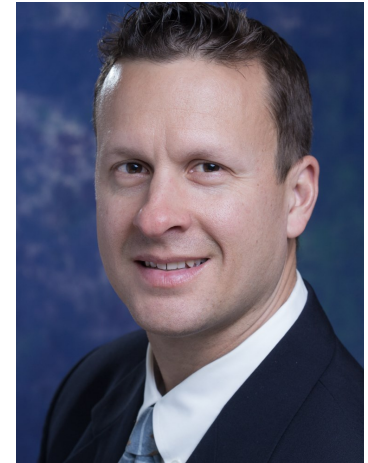
Dr. Lampert, whose research mission is to study and reduce the impacts of society on the environment, explained his views on sustainability and the role engineers like himself play in bettering sustainable practices.

“Sustainable societies depend on food, energy, and water resources for economic well-being. Food, energy, and water production are interrelated and exert substantial impacts on the environment,” he said. “The scientific community faces a grand challenge to provide the world’s population with energy and high quality food without damaging the environment. As engineers, we can try to find ways to reduce the environmental impacts of economic activities through technology and efficiency.”

He further explained the different aspects of sustainability, such as the world’s demands for food, energy, and drinking water.

According to the U.S. Environment Protection Agency, “Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations.”

“The reality is sustainability is such a complicated subject that it connects into all different parts of society; the social side, economic side and the environmental side. To me, sustainability is thinking about how we can integrate our economic activities in with these larger global cycles without changing them,” said Lampert.



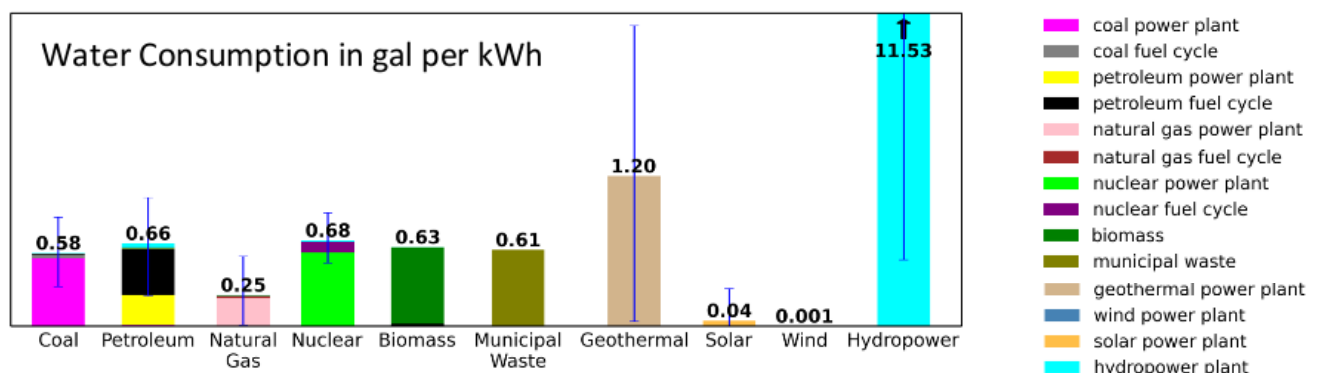
Dr. David Lampert

Lampert is working to promote sustainable practices with the world’s water resource management systems. He explained that Earth will eventually need more water than what is currently accessible. The issue is not in the amount of water, but rather the fact that much of the world’s water is not usable for consumption or cannot be properly harnessed. However, through his research and the research of many other professionals involved in water resources, advances in proper water management are being made.

The Water Center is grateful for the research contributions of Lampert, as well as events like the Science Café showcasing issues related to water resources.

Read more about water issues in the energy industry on our “Energy Development” page at <http://water.okstate.edu/strengths/industry/energy-development>.

Electric Power Water Consumption Comparison



Comparison of water demands for various energy sources.

World Water Day Celebration at OSU

(by Dr. Justin Moss, Interim Director of the Oklahoma Water Resources Center)



This March, we were honored to include Dick and Ma-linda Berry in our celebration of World Water Day, which kicked off with presentations from Center-funded personnel, including Berry Fellows. Mr. and Mrs. Fischer support the Berry Fellows through the Thomas E. Berry Professorship in Water Research and Management. In addition to the Berry Fellows, we also heard from recipients of the USGS 104b program and the DASNR Water Program.

Since this year's World Water Day theme was "wastewater", we arranged for a presentation and tours focused on wastewater. Dr. Dave Lampert presented on the emerging challenges of produced water management in Oklahoma. Then came a tour of Dr. Sergio Abit's On-site Wastewater Treatment Training Facility; and Dr. Doug Hamilton taught about lagoon management at the OSU Swine Farm.



World Water Day at OSU wrapped up with student-led Water Expo in which several student clubs showcased water demonstrations. Thank you to all the student clubs, especially the Biosystems and Agricultural Engineering Graduate Student Association, for making this event successful! Find more details about the day at <http://water.okstate.edu/wwd>.

Facts from the UN World Water Day Factsheet

- 1.8 billion people use a source of drinking water contaminated with feces, putting them at risk of contracting cholera, dysentery, typhoid and polio. Unsafe water, poor sanitation and hygiene cause around 842,000 deaths each year.
- 663 million people still lack improved drinking water sources.
- By 2050, close to 70% of the world's population will live in cities, compared to 50% today. Currently, most cities in developing countries do not have adequate infrastructure and resources to address wastewater management in an efficient and sustainable way.
- The opportunities from exploiting wastewater as a resource are enormous. Safely managed wastewater is an affordable and sustainable source of water, energy, nutrients and other recoverable materials.
- The costs of wastewater management are greatly out-weighted by the benefits to human health, economic development and environmental sustainability – providing new business opportunities and creating more 'green' jobs.

STUDENT SECTION:

The 2017 Student Water Conference Makes a Splash

(by Emily E. Horton, Communications Student Worker; and Leslie Elmore, Water Center Program Coordinator)

The Student Water Conference has been an annual event at Oklahoma State University (OSU) since 2012. The Oklahoma Water Resources Center continued this tradition in 2017, kicking off the Student Water Conference the evening of March 22nd—World Water Day—when students gathered for a welcome social and pizza with other participants.

Starting early Thursday morning, 85 participants, including 62 student presenters, from across the country gathered in OSU's Student Union to share and learn about a broad range of water research projects. Students were given the option to present their research in one of two poster sessions or orally.



Students share their research and a common experience at the 2017 Student Water Conference.

Mixed throughout the student presentation sessions of the first day, invited speakers gave insight and advice on professional development and networking.

Dr. Scott Stoodley, director of OSU's Environmental Science Graduate Program, spoke on professional development in the water research field. Dr. Stoodley has been involved in water quality issues for over 20 years, working in private industry, academia, non-profit organizations, and state government. Through his presentation, Dr. Stoodley shared his knowledge of water research and some of the potential paths they might take to achieve their career goals.

Amy Gazaway, Oklahoma State University's Career Development Coordinator, shared key points of networking such as the importance of a proper handshake, making introductions, and preparing for professional events.

The evening concluded with water trivia and barbecue for participants.

"I think everyone enjoyed the barbecue and getting to know each other a little," said Abigail Parnell, student conference organizer. "It was a nice chance to get to know participants from the conference and relax a little bit."

Friday morning began with a welcome from Dr. Tom Coon, vice president, dean and director of Division of Agricultural Sciences & Natural Resources at OSU, followed by a student oral presentation session, a student poster session, and invited speakers to share their specific knowledge and expertise with the students.

Dr. Robert Nairn, the Director of the Center for Restoration of Ecosystems and Watersheds at the University of Oklahoma, spoke on the role of natural infrastructure in addressing water quality and quantity issues through conservation of existing ecosystems or designing and building of ecologically engineered ecosystems.

Rob Singletary, General Counsel of the Oklahoma Water Resources Board, spoke on the Historic Water Agreement, in which the State of Oklahoma, Choctaw Nation, Chickasaw Nation, and City of Oklahoma City worked together to find a compromise that addressed the needs of all parties.

Keeping with World Water Day's theme: "wastewater", a panel of experts, including representatives from Chesapeake Energy, OK Corporation Commission, Garver Engineering, and Oklahoma State University form a "produced water panel." Each panel member gave his/her unique perspective on the challenges presented by water produced through oil and gas development practices.

For the second year, we invited agency professionals to take part in a meet-n-greet with the student participants. The meet-n-greet allowed student participants to practice their newly honed networking skills with potential future employers within the water resources field.

(SWC continued on page 6)

Faculty Spotlight: Sergio Abit

(by Sergio Abit, Assistant Professor of Plant and Soil Sciences, Oklahoma State University)

**Dr. Sergio Abit at the Onsite Wastewater Treatment Training Facility**

Have you ever had a professional lunch meeting with somebody who, while working on his T-bone steak, seems comfortable talking about septic systems and household wastewater? Well, I have had many of those kind of meetings. That “comes with the territory” when you are the state specialist for onsite wastewater treatment systems (OWTS) or septic systems for Oklahoma. I run an extension program designed to promote awareness about OWTS and provide training opportunities for stakeholders in the septic system industry. As state specialist, I work with various partners in developing and administering professional education courses. I also organize the annual state-wide conference for the septic system industry and oversee the Oklahoma Onsite Wastewater Treatment Training Facility in Stillwater, OK.

I specialize in Environmental Soil Physics with much of my previous research focused on the subsurface fates of pollutants such as nitrogen, phosphorus and bacteria – the same pollutants that I have to worry about in septic systems and domestic wastewater. In addition to being an extension specialist, I am an assistant professor of soil science at Oklahoma State University (OSU). I am the undergraduate program coordinator in the department of Plant and Soil Sciences at OSU and teach several courses including the Fundamentals of Soil Science and Environmental Soil Science.

In my free time, I play tennis, enjoy working in the yard, and hang out with my wife and two kids. I play the acoustic guitar and enjoy going to local thrift shops to find old CDs to add to my music collection. (I recently scored Neil Sedaka, John Denver, Marty Robbins, Kenny Rogers, the Rolling Stones, and Jim Croce CDs!).

(SWC continued from page 5)

Sixteen volunteers judged the student sessions over the two days. Upon completion, individual scores were tallied and winners were chosen. The following top presenters were announced at the awards ceremony, which capped off the conference.

Oral Presenters:

1st place: Holly Enlow (OSU)

2nd place: Ashwin Kumar Yegya Raman (OSU)

3rd place: Manabendra Saharia (OU)

“The Student Water Conference is a great opportunity to network with other water researchers in different fields,” said first place oral presentation winner, Holly Enlow. She explained the benefits of gaining others’ perspectives on the many aspects of water research.

The Oklahoma Water Resources Center looks forward to hosting future Student Water Conferences allowing more students to gain this valuable presentation experience and networking opportunity.

Poster Presenters:

1st place: Justin Scott (OSU)

2nd place: Brandon Holzbauer-Schweitzer (OU)

3rd place: Saeed Beyki (OSU)

Drought Is Everyone's Concern

(by Leila McKindra, Communications Specialist, Agricultural Communications Services)

It is unlikely a wheat producer living in rural Oklahoma and an accountant comfortably settled in one of the state's urban centers will view drought in the same way.

More to the point, drought is in the eye of the beholder.

"If you're a rancher or farmer it can be something that damages your crops or pasture or makes your farm pond go dry or low," said Gary McManus, state climatologist for the Oklahoma Mesonet. "If you're a lake manager or water manager for a city, it's something that can drain your lake or cause it to not fill up when you really need that recharge. If you're a tourism director, it can cause people not to come to your state."

Every segment of the population will feel the effects of an extended period of no precipitation, and despite harboring vastly different perspectives on the potentially devastating natural phenomenon known as drought, the best chance of successfully managing its effects lies in a concerted all-hands-on-deck approach.

"We're all in this," said Saleh Taghvaeian, assistant professor and Oklahoma State University Cooperative Extension specialist in water resources. "The drought impacts all of us – agriculture, urban populations, industry – so we have to take all the measures we can to be ready and prepared for the next drought."

To be clear, the stakes are serious. Water is not the limitless natural resource it appears to be when a faucet, sprinkler or irrigation system is turned on. As evidence, consider Taghvaeian's recent research on previous droughts in Oklahoma and their impact on irrigated agriculture.

Part of the findings indicate that over the past 15 years in the Oklahoma Panhandle, where producers rely on the Ogallala Aquifer for irrigation, the aquifer's water levels have dropped about 18 feet on average. However, 60 percent of that decline occurred during four years of the most recent drought from 2011 to 2015.

"In parts of the state that have access to groundwater they can pump during drought, it's usually a more rapid decline of water resources during drought years," Taghvaeian said. "It'll impact the future of that water resource and its availability in that region."

Particularly in the case of groundwater resources, which are harder to quantify because they are below the surface, Taghvaeian said people should think of it like a savings account.

"During drought years, you're paying out of your savings account and you're paying much more than the amount of money going into the savings account," he said. "Maintaining a negative balance and spending a whole lot of money rapidly is something people should keep in mind when they think of drought."

Frankly, it might seem silly to be talking about drought when spring hasn't officially arrived and summer, with its scorching triple-digit temperatures, is still several weeks away. Not to mention, the state has been the gracious recipient of a couple soaking rains in the past few weeks.

However, drought is always a possibility in Oklahoma. In fact, the most recent Oklahoma U.S. Drought Monitor map for Oklahoma, dated March 7, was a kaleidoscope of colors indicating the presence of drought in varying intensities, including a couple pockets of extreme drought, across a majority of state.

Of course, none of this means a full on drought is imminent, but it is a good reminder of the dire possibility.

Consumers may experience the pain of drought in their wallets in the form of increased prices for staples such as milk, beef and wheat products like bread.

Just as everyone will feel the sting of drought, there is a role for everyone in terms of preparing for and managing through it.

For urban populations that may mean keeping a tidy yard to reduce the fire hazards around the home or turning off the faucet while brushing teeth or being smart about watering the lawn.

For producers, it may mean commissioning an irrigation audit to see where the system is losing water and exploring steps to prevent that waste. Or it could mean pursuing new sensor technologies or advancements in irrigation systems.

The good news is Taghvaeian is seeing an uptick in the interest from those both outside and inside the agriculture industry in terms how to be the best stewards of limited natural resources.

"It's good to see all that interest from our citizens and stakeholders to conserve these natural resources," he said. "Our producers are well aware of the value of our natural resources. They're always trying to conserve these resources and use them in the best way possible."

Except taken from a March 16, 2017 Agricultural Communications Services's article. Read the full article at <http://www.dasn.okstate.edu/news/premier-news/drought-is-everyones-concern>.

New & Noteworthy

Funding (<http://water.okstate.edu/researchers/funding>)

- EPA: Region 6 Wetland Program (due 4/14/17)
- USDA-NRCS: Regional Conservation Partnership Program (pre-proposal due 4/21/17)
- USDA NIFA AFRI Water for Food Production Systems Challenge Area (LOI due: 5/17/17)
- USDA NIFA: Special Research Grants Program - Aquaculture Research (due 5/17/17)
- Partners for Fish and Wildlife (due 9/30/17)

Employment (<http://water.okstate.edu/job-board>)

- Oklahoma State University Robert M. Kerr Food and Agricultural Products Center research assistant
- Oklahoma State University Grass Breeding and Genetics Research Program research assistant
- METER: Product Development Scientist
- City of Stillwater Transportation and Stormwater director
- University of Idaho director of the Idaho Water Resources Research Institute

Events (water.okstate.edu)

- OCLWA Conference (Stillwater; 4/5-6)
- Landscape Design & Management Workshop (OKC; 4/21-23)
- DSSAT 2017- Assessing Crop Production, Nutrient Management, Climate Risk, and Environmental Sustainability with Simulation Models (Griffin Campus of The University of Georgia; 5/15-20)
- American Public Works Association Oklahoma chapter / Oklahoma Water Environment Association conference (OKC; 5/22-24)
- EMBeRS Summer Workshop (El Paso; 6/8-16)
- 32nd Annual WaterReuse Symposium (Phoenix, AZ; 9/10-13)

Connect



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