

Faculty cohort diversifies Fresno State's water connection

by Lanny Larson

For more than a century, water has been a cornerstone of Fresno State's connection with the San Joaquin Valley. Now the university is taking its investigation of this life-sustaining and troubled resource to a much higher level in the second year of a new faculty Water Cohort.

The five faculty cohort members spent 2012-13 establishing promising partnerships on and off campus, charting new projects, identifying funding sources, developing courses to improve university and community water literacy and learning about regional water challenges.

Fresno State was "baptized in water" — founded in 1911 to train teachers for the children of farmers and others who "rushed" to the Valley from all over the world in the late 19th century, attracted by the free flow of water running down from the Sierra snowpack.

Fresno State Normal School quickly expanded its teacher-education curriculum, adding courses about the region's No. 1 economic driver — farming — and its driving force — water.

Fresno State now is a world center of water. Partnering with industry and government agencies, Fresno State faculty, students and staff study efficient water delivery, conservation, drought-tolerant crops, supply development, quality, recycling and incorporating new technologies (satellite, infrared and computer).

The campus houses the Center for Irrigation Technology (CIT), International Center for Water Technology (ICWT) and the Water and Energy Technology (WET) Center and is a partner in Blue Tech Valley — an ambitious initiative to create a Silicon Valley-like hub of water research and development.

The cohort enhances all that, says Charles Boyer, dean of the Jordan College of Agricultural Sciences and Technology, by embracing the premise that water touches nearly every aspect of our lives and deserves comprehensive investigation by Fresno State. After decades of agricultural emphasis in its investigation of water, Fresno State's Water Cohort "is part of a more integrated approach to water management," Boyer says.

"Campus-based research addresses a wide range of local issues, including water use efficiency in agriculture and urban settings, integrated regional water management planning and water needs of disadvantaged communities," says David Zoldoske, director of Fresno State's Center for Irrigation Technology and water policy adviser for the California State University system.

Fresno State is the lead organization for the Water Resources Policy Initiatives, bringing together expertise from the 23 CSU campuses to focus on solutions for California water challenges and training students to be the water problem-solvers going forward.

Fresno State and its partners, says Zoldoske, seek "sustainable water supplies and improved water quality [while] proving that, on a good day, water brings the community together like few other issues to find a common path for our future."

The faculty Water Cohort became reality in 2012 with a \$300,000 research fund gift from Claude Laval, a water filtration entrepreneur, longtime Fresno State benefactor and partner in water research.

At its launch, the Water Cohort envisioned participation from many departments (and their schools/colleges):

- **Civil and Geomatics Engineering** (Lyles College of Engineering), specializing in hydraulics, water resources and environmental engineering.
- **Curriculum and Instruction** (Kremen School of Education and Human Development), specializing in science, technology, engineering, and mathematics education (STEM).
- **Earth and Environmental Sciences** (College of Science and Mathematics), specializing in hydrogeology.
- **Geography** (College of Social Sciences), specializing in water management for landscape.
- **Management** (Craig School of Business), specializing in relationships between water quality and water policy, sustainability, logistics and entrepreneurship.
- **Mass Communication and Journalism** (College of Arts and Humanities), focusing on media production (environmental media production and journalism).
- **Plant Science** (Jordan College of Agricultural Sciences and Technology), specializing in irrigation and water management.
- **Public Health** (College of Health and Human Services), specializing in water quality and community health.

In its first year (2012-13), five slots in the cohort were filled by:

- **Frederick Nelson**, an assistant professor in the Department of Curriculum and Instruction, who teaches science methods courses for future elementary and secondary teachers and is studying how the Water Cohort is collaborating on the design and implementation of an interdisciplinary general education course on water literacy.
- **Fayzul Pasha**, an assistant professor of water resources in the Department of Civil and Geomatics Engineering, who is an expert on energy management in water distribution systems and hydropower resource assessment.
- **Florence Cassel Sharma**, an assistant professor of plant science and water-management expert, whose ongoing research is helping West Side San Joaquin Valley growers to tailor irrigation delivery methods and amounts to specific crops.
- **Jes Therkelsen**, an assistant professor of environmental media, is a documentary filmmaker who has worked with potential community partners to produce short documentaries on a variety of water issues.
- **Beth Weinman**, an assistant professor of earth and environmental sciences, who has worked with students on research into water contaminants and on building alliances on campus to conserve water.

Early collaborations signal cohort success

The university recently earned approval for an online Professional Science Master of Water Resources Management degree program. Water Cohort faculty are facilitators in a new course offered through the Department of Earth and Environmental Sciences: “Interdisciplinary Topics in Water: The Social, Political and Scientific Theories of Water.”

At the Blue Tech Valley Conference in May, cohort members learned about Valley water resources, their use, problems caused by scarcity, water-management solution possibilities, efficiency options and how agricultural yield and energy efficiency can be improved, says Fayzul Pasha, assistant professor of water resources.

The interdisciplinary water-literacy course is one answer to conference questions. It’s scheduled for a fall 2014 launch.

The course will emphasize water’s importance in the Valley and engage local, regional and national experts across many disciplines to bring perspective to critical issues. Students will follow up each expert session with a small-group discussion led by a cohort member. Students will form collaborative groups for a culminating project to be archived for future student and community use.

One goal, Pasha reports, is increasing science, technology, engineering and math (STEM) participation by including students outside traditional STEM disciplines. The course also will “create a more informed, environmentally literate citizenry equipped to better evaluate and resolve environmental challenges.”

Beth Weinman, assistant professor of Earth and Environmental Sciences, experienced a multidisciplinary academic approach in her doctorate program at Vanderbilt University, participating in a year-long study of storing the nation’s nuclear waste at Yucca Mountain, Nev. It was team-taught by engineering, sociology and geology faculty with undergraduate and grad students in psychology, sociology, geology and engineering.

“I saw for the first time the role of my discipline — the long time and earth system perspective geologists can contribute to solving a complex problem versus the engineering, political and social aspects,” says Weinman. “From that class, I learned to appreciate even more what the other disciplines contribute and the important relevance of each to society.”

To chart this new academic course at Fresno State, Water Cohort faculty received a grant from the Water Resources Policy Initiative. “We have submitted a letter of inquiry to the Bechtel Foundation’s Environmental Literacy Program to support the design and implementation of this new course, ‘Water Questions,’” says Frederick Nelson, assistant professor in the Department of Curriculum and Instruction.

Cohort faculty also accepted an invitation to present a paper on its course-development to the Coalition of Urban and Metropolitan Universities Conference in Louisville, KY.

Zoldoske says, “The region’s fate is determined by how much water runs down the mountains, is pumped from beneath our feet and flows to us from the north. When these water sources are in balance, all is well. When they fail to deliver, it’s front-page news.”

“The campus has truly poised itself to bring about new cultures of learning to help with global problems, such as water,” Weinman says. “These types of problems are not solved by one discipline alone, and Fresno State, with its cohort support, is the perfect place to launch more engaging solutions.”

“Because of the relationship building experienced with the Water Cohort, I have felt comfortable in seeking out other interdisciplinary collaboration opportunities,” Nelson says. “Students will see faculty collaboration modeled, as we work in each other’s programs and courses to achieve our outcomes of enhanced water literacy.”

And Nelson believes one result of the Water Cohort will be a new generation of STEM teachers with broad-perspective training and understanding of water issues.

Says Nelson, “I see an experience with water as a stimulus for reflection, engaging teachers in a new consideration of their decisions about teaching and learning” that will resonate with their students for generations to come.

Before a formal interdisciplinary watery literacy course is added to the curriculum, Fresno State students, faculty and staff already are collaborating with Water Cohort faculty on a variety of water issues:

- Jessica Sanchez, one of Dr. Beth Weinman’s Earth and Environmental Sciences (EES) students, researches measurement of personal care products, pharmaceuticals and other contaminants that survive urban wastewater treatment and go back into the ground and aquifer below.
- Graduate EES student Dustin White is investigating arsenic distribution in Tulare County groundwater, collaborating with alumni Chris Johnson and Ken Schmidt and geochemical students at Cal State Bakersfield.
- EES students are working on other arsenic research partnerships, one with the University of Minnesota and India’s Physical Research Laboratory and another with Columbia University’s Lamont-Doherty Earth Observatory, focused on groundwater in Bangladesh.
- Weinman and colleagues Mara Brady and Peter Van De Water, and J.P. Moschella and Criss Wilhite, both in the Department of Psychology, are establishing a sustainable learning community to conserve water on campus.
- Fayzul Pasha (Civil and Geomatics Engineering) has met with Facilities Management division leaders on campus to talk about water-management issues.
- Efforts have begun to bring faculty, students and staff together to ensure good tree canopy coverage and sustainable landscape on campus, which is a state arboretum and has won national recognition for its forest.
- Florence Cassel Sharma (Plant Science) and some of her students have worked with sugar beet producers in western Fresno County on the impact of changing traditional surface irrigation practices to more efficient and sustainable drip systems.
- With other faculty and students, Frederick Nelson (Education Curriculum and Instruction) assists the “Physics Pedagogy and Outreach” course to develop a protocol for observing and evaluating effectiveness of student-led outreach demonstrations.