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Interdisciplinary team awarded \$2.9 million NSF Research Traineeship grant to strengthen rural communities

Water shortages and their accompanying threats to the agricultural economy aren't new to Kansas, but a fresh approach to training graduate students at Kansas State University aims to adopt innovations that will protect rural communities.

Melanie Derby, assistant professor of mechanical and nuclear engineering, and Hal and Mary Siegele, professors of engineering at Kansas State University, will lead an interdisciplinary team that has been awarded a five-year, \$2.9 million National Science Foundation Research Traineeship Program (NSF NRT) grant to train graduate students who can address these complex challenges. The award was [one of 17 NRT projects funded nationwide](#) and is the first NRT awarded in the state of Kansas.

"One of our goals is to help western Kansas and other semi-arid communities to be resilient in the future. We need all the components - engineering, agricultural economics, sociology, and more - to solve these important challenges," Derby said.

Derby and her colleagues will mentor graduate students as they conduct fundamental research in three areas of the crucial food-energy-water system: conservation of and producer relationships with the Ogallala aquifer, soil-water-microbial systems, and technologies to transform animal waste into energy and water. They also will work to understand engineering, economic and socio-cultural barriers to implementation of emerging innovations.

Building communication skills and a common vocabulary across disciplines is a crucial aspect of the training. Students will engage with policymakers and attend state legislative sessions in Topeka, plus they will spend time at the Southwest Research-Extension Center in Garden City to research smart water technologies and meet with farmers and others whose livelihoods depend on conserving the aquifer and other resources.

Matt Sanderson, co-principal investigator and distinguished professor of sociology, anthropology and social work in the College of Arts and Sciences, said people in many rural Kansas communities face problems from soil erosion, groundwater depletion and water pollution to the loss of population, youth out-migration, growing elderly populations, loss of businesses and declining economic diversity.

Sanderson said that exploring social contexts and helping students think beyond their fields of specialization will encourage new kinds of problem solving.

Charles Taber, Kansas State University provost and executive vice president, said the program Derby and her team have designed is consistent with the land-grant mission of attaining excellence in teaching, research and outreach.

"Sustaining the health of rural communities, the Ogallala aquifer, and the food-energy-water system is mission-critical for Kansas," Taber said. "I look forward to hearing about the achievements of these students as they apply their work and strengthen ties to the communities our university serves."

The program will train 50 master's and doctoral students, including 25 funded trainees from the colleges of Engineering, Arts and Sciences, and Agriculture.

KSU Foundation announces \$174.2M in fundraising in fiscal year 2018 for Kansas State University

Philanthropic gifts and commitments to Kansas State University given through the [Kansas State University Foundation](#) totaled \$174.2 million for the fiscal year that ended June 30, 2018. This marks the second most successful year in the university's fundraising history.

If the \$174.2 million raised in fiscal year 2018, donors gave 61 percent - or \$106 million - through endowed gifts, pledges and deferred gifts, which ensures the long-term prosperity of the university. In addition, the value of the university's long-term investment pool grew to \$539 million as of June 30, 2018.

"K-State is an education, innovation and service leader because of the commitment that generous alumni and friends make toward the university," said Richard B. Myers, university president. "Every day, K-Staters demonstrate their confidence in the future of the university and its ability to achieve its mission as a land-grant institution to make quality education accessible to all."

Other key philanthropic achievements for the 2018 fiscal year included:

- Cash, pledges and commitments of \$1.2 billion had been raised as of June 30, 2018, toward the \$1.4 billion innovation and Inspiration Campaign goal.
- 170 new scholarships were created, up from 124 in fiscal year 2017, and \$37 million total gifts and commitments for scholarships and student success raised.
- Private funds of \$92.2 million were made directly available to campus for students, faculty, facilities and programs.
- 28 gifts and commitments of \$1 million or more were made, totaling nearly \$100 million.
- 43,000 alumni and friends gave to advance K-State and over 20 percent of alumni gave to support the university, exceeding the national average of 5 percent of alumni who give to their alma maters.
- Gift commitment through estate planning, including wills, trusts and annuities, reached an all-time high of \$61.2 million, up from \$57 million in fiscal year 2017.



Large-scale study aims to improve burning management of Flint Hills

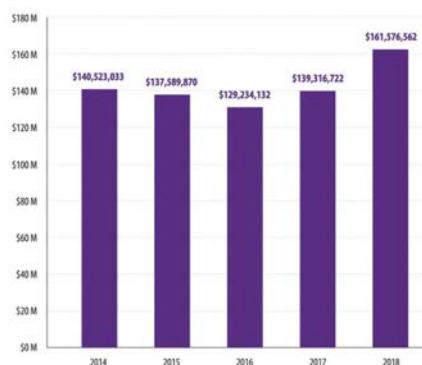
Kansas State University researchers are part of a large collaborative project that is using unmanned aircraft to improve the [Kansas Flint Hills Smoke Management Plan](#).

The three-year project is funded by the Kansas Department of Health and Environment and involves university scientists; NASA scientists; unmanned aircraft systems (UAS) pilots from the Kansas State University Polytechnic Campus; meteorologists; ranchers; and environmentalists. The research team members have varied backgrounds, but they all share a common goal: improve the environment and human health while balancing the livelihood of ranchers and farmers.

The team is collaborating with a Flint Hills rancher to gather data during typical tallgrass prescribed burns. The researchers have attached sensors on unmanned aircraft to gather air quality information during a burn.

In the past, when the weather conditions were right Flint Hills spring burning affected air quality in Wichita,

Kansas State University
Total Extramural Research Funding
(Fiscal years 2014-2018)



Extramural research funding and invention disclosures set university record in FY 2018

In fiscal year 2018, the university's researchers obtained 1,567 grants and industry contracts for a total of \$161,576,562 in extramural funding. In the last three years, the funding total has increased 25 percent.

Extramural funds come from federal funding agencies such as the U.S. Department of Agriculture, the National Science Foundation (NSF) and the National Institutes of Health (NIH), as well as state, area, and local governments and private foundations. Industry agreements and philanthropy also provide support for research.

Topeka, Kansas City and metropolitan areas in Nebraska and Oklahoma. The poor air quality is bad for people with asthma and other health problems. The challenge is that fire is needed to maintain the integrity of the tallgrass prairie landscape.

To test a prescribed burn, the researchers are working with Jane Koger, a Matfield Green rancher. Koger has allowed the researchers to collect data before, during and after the annual burns on her ranchland.

UAS pilots gather smoke emissions from a controlled burn by flying three unmanned aircraft into the smoke above the fires. The unmanned aircraft use continuous sensors and sample sensors to measure particles and ozone-causing chemicals, and they use thermal imaging to measure fire temperature. The continuous sensors use lasers to take measurements and send data, including particle concentration, ozone levels, temperature and humidity. The sample sensors have a small bag to gather and bring back air particulate samples that are analyzed for particulate matter as well as nitrogen dioxide and volatile organic carbon levels.

After each burn, the researchers have a record of grass biomass that was burned, the fire's heat levels and the emission levels from the fire.

This data is helping NASA verify satellite imagery and remotely driven emissions estimates. NASA uses imaging from satellite data to determine a fire's intensity and smoke emission rates. To complete validation, researchers combine direct measurements of black carbon production with data from a thermal camera that measures the full range of a fire's internal temperatures. The research also is helping NASA improve satellite data models.

For rancher Koger, the research project can help ranchers like her learn how to maintain the tallgrass prairie without damaging their livelihoods.

"I think it's important to get a better understanding of what we are doing and what we are putting into the air," Koger said. "When we have concrete science - and when K-State shares that - ranchers listen."

"These figures show how hard our researchers across the university are working to fund their explorations," said Peter Dorhout, K-State vice president for [research](#). "Researchers face stiff competition for these funds. They have to write the best proposals and do the best work to obtain funding, and I'm proud of their achievements."

According to the [full report from fiscal year 2018](#), the university garnered an increasingly diverse portfolio of funding awards. Awards from the NSF increased nearly 59 percent over the previous fiscal year, and awards from the U.S Department of Health and Human Services, which includes NIH, increased by 34 percent.

K-State also succeeded in attracting industry-funded projects, adding 291 new projects this year.

Another bright spot in FY 2018 was technology transfer, or movement of intellectual property that results from research, scholarship and creative activity and discovery efforts of faculty from university offices and labs into the marketplace. Researchers disclose inventions as a first step in protecting intellectual property and exploring whether an innovation could be patented. The [Kansas State University Research Foundation](#) received a record number of invention disclosures for the fourth-straight year, partially owing to the success of first-time inventors.

Technology transfer from the university, also known as commercialization, accelerates the delivery of research results to the public. It also results in increased licensing revenue for faculty and the university, which signed 105 commercial agreements that brought in more than \$825,000 in new revenue and a total of more than \$2.8 million in fiscal year 2018.

DID YOU KNOW?

DesignIntelligence ranked Kansas State University's College of Architecture, Planning and Design fifth in the nation in their Practice Management category.



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