

ONE FUTURE

Together, We Find a Way.

GROWING SOLUTIONS

Farming for Prosperity, Clean Water and Healthy Communities

CASE STUDIES FROM KANSAS

The Nature
Conservancy 

Cover Crops © K-State Research and Extension



Milford Lake, the largest man-made lake in Kansas, has seen a steady increase in toxic algal blooms over the last 10 years, hurting fish and birds and threatening drinking water. © Lauran Jackson/TNC Photo Contest 2019



“Since we’ve been using cover crops and more diverse crop rotations, when a big rainfall event happens, I can sleep better because I know my soil stays in the field and is not running off into the waterways.”

JUSTIN KNOPF, 5TH GENERATION FARMER, SALINE COUNTY, KANSAS

Photo © Marsha Boswell/Kansas Wheat

Farmers and ranchers play a significant role in improving public health for Kansans by using practices that enhance soil health and protect water quality. Continued and expanded public support for these practices is essential for growing food that nourishes both people and the planet.

Kansas is a cornerstone of America’s agricultural strength. In 2024, its farmers produced nearly 307.5 million bushels of wheat—enough to feed 4 million people for a year—and led the nation in sorghum production, a vital crop for feed, fuel, and food. Kansas also ranks among the nation’s top 10 beef producing states, with nearly two million cattle on feed and pasture each year. Yet, this extraordinary productivity is not without consequence: the demands of modern agriculture place significant pressure on Kansas’ natural resources, especially soil and water, in ways that also create risks to human health and wellbeing.



“We know what practices and technologies work for reducing nutrient runoff, increasing nutrient use efficiency, and ultimately improving profitability, but there are economic and social barriers that cost-share and technical support programs can help overcome.”

CHUCK RICE, PH.D., UNIVERSITY Distinguished Professor of Agronomy, KANSAS STATE UNIVERSITY

Photo Courtesy of Dan Donnert/KSU

Excessive fertilizer use stands out as a particularly significant concern. Fertilizer runoff has contributed to nitrogen pollution in drinking water² and to toxic blue-green algae in reservoirs like Milford Lake, which serves over 800,000³ Kansans. In recent years, these harmful algal blooms have disrupted recreational activities and posed serious health risks to people, livestock, and wildlife—threatening the places and activities Kansans cherish.

Health Impacts

The impacts of nitrogen contamination are felt most acutely at the community level—affecting families across Kansas. Notably, nitrate exposure—even at concentrations below current regulatory limits—has been associated with increased risk of blue baby syndrome (low blood oxygen), certain cancers, thyroid dysfunction, and neural tube defects⁴.

Private wells, which are not subject to state water quality standards⁵, present a particular challenge and underscore the critical need for collaboration between public officials and private individuals to safeguard drinking water supplies. Research from Kansas State University revealed that half of the private wells sampled in South-Central Kansas contained nitrate levels exceeding the national clean water standard⁶. Even small towns in Kansas are installing nitrate removal treatment plants, doubling water bills in some communities⁷. These developments highlight an urgent need to protect both public health and household budgets through collaborative water quality management and programs.

“We know what practices and technologies work for reducing nutrient runoff, increasing nutrient use efficiency, and ultimately improving profitability, but there are economic and social barriers that cost-share and technical support programs can help overcome,” says Chuck Rice, Ph.D., university distinguished professor of agronomy at Kansas State University.

Effective Solutions

Luckily, regenerative farming and ranching practices are proven to enhance soil health, reduce erosion, and lower nitrate leaching. Practices like diversified crop rotations and mixed plantings help farmers reduce reliance on costly nitrogen fertilizers. Others—such as cover crops, grassed waterways, and edge-of-field buffer zones—keep soil covered year-round and act as natural filters, trapping or breaking down pollutants like nitrates before they reach streams or seep into groundwater.

“Since we’ve been using cover crops and more diverse crop rotations, when a big rainfall event happens, I can sleep better because I know my soil stays in the field and is not running off into the waterways,” says Justin Knopf, a 5th generation farmer in Saline County, Kansas. “And my crops aren’t going to be decimated either.”

Healthy soils, enriched with organic matter and living roots, function like sponges—absorbing and retaining water and nutrients, which reduces nitrate-laden runoff during heavy rains and extends moisture availability for crops. The result is not only cleaner water but also more resilient and productive farmland.

Regenerative ranching practices that restore native plant communities, such as brush management, prescribed fire, and rest-rotation grazing, also improve the quality and quantity of Kansas water supplies, by increasing infiltration, reducing sedimentation in reservoirs, and improving aquifer recharge. Importantly, these practices improve the resilience of ecosystems and grazing enterprises, and they reduce the risk of catastrophic wildfire.

Scaling Regenerative Practice Adoption

Adopting regenerative practices can be complex, especially given the unique conditions of each farm and ranch. It often takes time and experimentation before improvements in outcomes and profitability become evident. But ultimately, these practices can reduce contaminated runoff by 50-85%. That’s why support from extension agents and access to state and federal funding are essential—they help producers manage risk and invest the time necessary in regenerative solutions that benefit both their operations and water quality. Kansas offers strong examples of this collaborative approach. One example is the **Kansas Water Quality Buffer Program**, which complements the federal **Conservation Reserve Program** and has enrolled tens of thousands of acres since its inception. Another is the **Milford Regional Conservation Partnership Program** (RCPP) led by the Kansas Water Office and NRCS’s Great Plains Grassland Initiative.

“Cost-share and technical support programs can be the thing a farmer needs to get over that hurdle of actually trying something and implementing it on their farm, because it’s risky doing something new, and it takes a lot of learning and study and gathering of information,” says Knopf. “It’s more of a long-term investment.”

“Continued investment in NRCS programs—such as the Regional Conservation Partnership Program—and other federal and state initiatives is critical.”

MATT UNRUH, ASSISTANT DIRECTOR, KANSAS WATER OFFICE



Photo Courtesy of Matt Unruh



Cover crop roots help build healthy soil even at early growth stages. © Lynn Betts/NRCS/SWCS



Regenerative agriculture practices can help ensure safe water for all Kansans. © Michael D-L Jordan

These public programs help farmers make continuous improvements to soil health, productivity, and the overall resilience of their farm and grassland ecosystems—while also delivering cleaner water for drinking and recreation. However, these programs can only be successful when paired with trusted and skilled technical advisors from the Natural Resources Conservation Service (NRCS), university extension, or other partners⁸. Robust funding and rigorous training for field conservation professionals is not only a smart investment in agricultural success but also a critical step toward protecting public health and safeguarding water resources for all Kansans.

“Continued investment in NRCS programs—such as the Regional Conservation Partnership Program—and other federal and state initiatives is critical,” says Matt Unruh, assistant director, Kansas Water Office. “These efforts provide the expertise and financial and technical support needed to expand soil health and regenerative agriculture practices to benefit Kansas agriculture, health and water resources.”

Reductions in nitrate contamination produce proportional improvements in public health outcomes⁹. But the benefits may go even further. Farmers’ use of regenerative practices have even been associated with their own improved well-being¹⁰.

Improving drinking water quality—and reducing the serious health risks and economic burdens linked to nitrate contamination—requires coordinated efforts among farmers, watershed managers, and scientists. With strong public support and strategic use of state and federal funding, Kansas can advance practical, science-based solutions that protect water resources, agricultural productivity, and health for all residents.

Farming and ranching aren’t just about food—they’re about health and prosperity for all Kansans. Polluted water is a real concern. By working together to support farmers and ranchers to use conservation practices, we can significantly improve water quality. It’s good for families, producers’ long-term business goals, and nature.

To learn more about our work in regenerative agriculture, visit nature.org/workinglands.

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1 USDA National Agricultural Statistics Service. 2024. Kansas Wheat History. https://www.nass.usda.gov/Statistics_by_State/Kansas/Publications/Cooperative_Projects/KS-wheat-history-24.pdf
2 Townsend M and D Young. 1999. Nitrate in Kansas Ground Water. [Kansas Geological Survey Public Information Circular 14—Part 1 of 5. https://www.kgs.ku.edu/Publications/pic14/pic14_1.html](https://www.kgs.ku.edu/Publications/pic14/pic14_1.html)
3 Milford Watershed RCPP. Milford Lake. Retrieved August 6, 2025 from <https://www.milfordwatershed.org/milford-lake>
4 Ward M. et al. 2018. Drinking Water Nitrate and Human Health: An Updated Review. *IJERPH* 15, 1557.
5 Ablah E, Marrow MW, Brown J, and Honn A. 2020. Analysis of Kansas Water Well Policies and Proposal of Nonpublic Household Water Well Recommendations. *Environmental Health Perspectives*, 128(2), 025001. <https://doi.org/doi:10.1289/EHP5507>.
6 Sougey M. 2024. [K-State’s interdisciplinary research tackles Kansas water](https://www.k-state.edu/interdisciplinary-research-tackles-kansas-water-challenges)

[challenges](https://www.k-state.edu/interdisciplinary-research-tackles-kansas-water-challenges). Seek. <https://www.k-state.edu/seek/fall-2024/liquid-lifeline-water-research/>
7 David Condos. [Small towns, big bills for rural Kansas drinking water increasingly tainted with nitrate from farm fertilizers](https://www.kprb.com/news/local/small-towns-big-bills-for-rural-kansas-drinking-water-increasingly-tainted-with-nitrate-from-farm-fertilizers). High Plains Radio – KPRS. March 28, 2022.
8 Personal communication (email), Matt Unruh, Asst. Director, Kansas Water Office.
9 Mathewson, P.D., Evans, S., Byrnes, T., Joos, A. and Naidenko, O.V., 2020. Health and economic impact of nitrate pollution in drinking water: a Wisconsin case study. *Environmental Monitoring and Assessment*, 192(11), p.724.
10 Brown, K., Schirmer, J. & Upton, P. Can regenerative agriculture support successful adaptation to climate change and improved landscape health through building farmer self-efficacy and wellbeing? *Current Research in Environmental Sustainability* 4, 100170 (2022).