
Working to ensure a water and food secure world.
THE DAUGHERTY
WATER for FOOD
GLOBAL INSTITUTE
at the University of Nebraska

Focused approach

DWFI works to bridge the worlds of large-scale and smallholder agriculture, concentrating on these major impact areas that are vital to water and food security both in Nebraska and globally:

- Closing Water and Agricultural Productivity Gaps
- Improving Groundwater Management for Agricultural Production
- Enhancing High-Productivity Irrigated Agriculture
- Advancing Freshwater and Agricultural Ecosystems and Public Health
- Addressing the Management of Agricultural Drought

Since 2010, the Daugherty Water for Food Global Institute (DWFI) at the University of Nebraska has worked toward one goal: a food and water secure world. We help farmers everywhere increase production while using water more effectively, and contribute scientific and policy research that informs decision-making and educates future leaders.

We are already seeing the devastating effects of climate change and facing the challenge of feeding nearly 10 billion people by 2050 — which makes our mission more urgent than ever before.

We must expand and accelerate our efforts to develop and deploy solutions, strengthen water and food systems, and reverse the wide-spread trend of water quality degradation.

Read more about our progress in our latest annual report
» **go.unl.edu/annualreport**

Solutions through partnerships and innovation

DWFI takes a holistic and collaborative approach to achieving food security with less stress on water resources, examining and integrating the environmental and human impacts of the challenge.

Located in one of the world's major farmland regions in a state known for its technological and institutional innovation, we leverage the expertise of the University of Nebraska and our Faculty Fellows and extend it through strong global and local partnerships.

With a living lab at our doorstep, we have the ability to ground-truth technologies while seeking valuable input from growers and stakeholders. We are nimble and have the flexibility to be innovative risk-takers, pursuing mission-related activities as they arise.

We train the next generation of problem solvers through our investment in postdoctoral researchers and students in a wide variety of fields who pursue projects focused on increasing water and agricultural productivity.

130+
Faculty Fellows

$3.14M
in Support of Student Research

150+
State and Global Partners

FEATURED PROJECTS

1 New Report Explores Business Ecosystem for Smallholder Irrigation in Rwanda

With a more developed irrigation industry, Rwandan farmers could take advantage of three growing seasons, rather than one, enabling better food security and income. However, there is still more knowledge needed to advance the industry.

DWFI recently completed a study that maps and analyzes the business ecosystem for smallholder irrigation in Rwanda. The Rwanda smallholder irrigation ecosystem map shines a light on farmer-led irrigation and analyzes the business ecosystem for providing related goods and services.

Based on its findings, the team laid out several challenges, opportunities and recommendations for the industry, including adjustments to the government subsidy program, opportunities for retailers to provide repairs and spare parts, and opportunities for youth entrepreneurship.

Learn more » **go.unl.edu/rwandareport**

2 Suite of Tools to Improve Irrigation Water Use and Agricultural Productivity

DWFI continually explores new and existing technology to help farm producers and water managers address complex challenges to water use. These efforts include:

Parallel 41 Flux Network

DWFI added three additional towers to its Parallel 41 Flux Network, which determines movement of water vapor and other gasses in cropped fields and helps measure evapotranspiration (ET) more accurately. This data and analysis is freely shared and helps growers apply the precise amount of irrigation water that crops need, when they need it, to achieve the best possible yields.

Flux towers also measure greenhouse gas emissions

DWFI and University of Nebraska researchers received a grant from the Department of Energy to add gas analyzers to some of its flux towers to measure atmospheric carbon dioxide, nitrous oxide and methane fluxes. The towers will also measure soil emissions of these gasses.

These technologies allow researchers to estimate a complete carbon balance and can provide a profit incentive in the form of carbon credits to the farmers in future carbon markets. These methods can later be applied to production agriculture in other parts of the U.S. and the world.

DAWN: Dashboard for Agricultural Water Use and Nutrient Management

The DAWN project aims to provide farmers with a powerful, predictive decision-making support tool to sustain food and energy crop production. DAWN is supported by the USDA–NIFA and is a collaborative effort among several universities and organizations.

DAWN will incorporate modeling previously developed by DWFI's Director of Research. Collaborators hope to provide an accurate set of seasonal climatic forecasts from one to nine months in advance, as well as one to six-day weather forecasts during the growing season. This can help growers maintain or increase crop productivity while minimizing environmental impacts.

Learn more » **go.unl.edu/irrigationtools**

3 Understanding Groundwater Markets and Transfers in Nebraska

Nebraska includes most of the water contained in the country's largest aquifer and approximately 88% of its residents rely on groundwater as drinking water. Simultaneously, the state is home to more than 96,000 irrigation wells and the most pivot irrigation systems of any state.

In Nebraska, a landowner has the right to use groundwater, subject to regulation, by owning the overlying land. Groundwater regulations are determined by the state's 23 Natural Resources Districts (NRDs). DWFI researchers have collected information from seven of these NRDs to better understand the variability in regulations, including transfer types, environmental and conservation goals, and even the language used to define the rules. Interstate compacts, settlements, and federal endangered species programs can also affect the regulations and market transaction costs, which vary greatly across districts.

Learning from Nebraska NRDs could help decision-makers seeking to implement groundwater markets in other regions.

Learn more » **go.unl.edu/NEwatertransfers**

4 Faculty Fellow Inspires Students Through Irrigation Field Course

A summer irrigation lab and field course led by DWFI Faculty Fellow Derek Heeren helps his students ground their class lessons through in-person farm and industry visits. Heeren, also an Associate Professor and Irrigation Engineer in the UNL Department of Biological Systems Engineering (BSE), teaches the course to students from all over the world, including China, Sudan and Rwanda. For many of them this is their first introduction to farming in Nebraska.

In the course, sponsored by DWFI and BSE, students learn about wise management of water resources. This is done through studying the performance of different types of irrigation systems, sources, pipelines, well hydraulics and soil water properties. It also includes experiential components, with students traveling across Nebraska, meeting with industry leaders, water managers and farmers across the state. By teaching students applicable skills in water management, and introducing the experience of working with different stakeholders, Heeren inspires students to take on real-world challenges and use this knowledge in their future careers.

Learn more » **go.unl.edu/fieldcourse**

5 Researching Solutions, Fostering Communication Regarding AltEn Environmental Crisis

AltEn, a company in Mead, Nebraska, used seed coated with fungicides and insecticides to produce ethanol. The waste from its production was then sold to farmers as a soil conditioner until the Nebraska Department of Environment and Energy (NDEE) ordered the company to cease operations in 2021.

University of Nebraska researchers, including DWFI's Director of Water, Climate and Health, several DWFI Faculty Fellows, and the Water Sciences Lab Director are sampling homes, water, soil, air and small animals in the area for possible environmental effects. They hope to begin a medical registry that will follow willing participants for at least ten years, starting in January.

Learn more » **go.unl.edu/alten**

6 Research Looks to Control Nitrate Leaching, Protect Nebraska Groundwater

Around the world and across Nebraska, nitrogen fertilizer is regularly used to grow crops. Some of this nitrogen is converted to nitrate that can be easily lost from the root zone, contaminating ground and surface water. In addition to being harmful to human health, excess nitrate in drinking water is costly for small communities to treat. Sandy, irrigated soils in Nebraska are highly vulnerable to nitrate leaching, and few options exist for controlling nitrogen losses from these fields.

The Nebraska Water Center and the Water Sciences Laboratory, both part of DWFI, are researching how injecting carbon into the subsoil — by way of mulch and sawdust — could absorb and remove extra nitrate from the soil. They will monitor differences in nitrate leaching between treated and untreated fields to measure the method's effectiveness.

The project seeks to demonstrate the efficacy and cost effectiveness of using an abundant carbon source to intercept and remove dissolved nitrate after it has left the root zone.

Learn more » **go.unl.edu/nitratemulch**

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