

# Nebraska Water Center

Robert B. Daugherty Water for Food Institute  
University of Nebraska



## Who We Are:

The Nebraska Water Center (NWC), established by Congress in 1964 as one of 54 Water Resources Research Institutes nationwide, focuses on helping the University of Nebraska (NU) become an international leader in water research, teaching, extension and outreach by facilitating programs that will result in NU becoming a premiere institution in the study of agricultural and domestic water use. The NWC helps arrange research addressing water problems or water understanding; helps new water researchers and engineers; and publishes research results to water professionals and the public through publications, colloquiums and conferences, lectures and tours. The NWC is part of the Robert B. Daugherty Water for Food Institute and part of NU's Institute of Agriculture and Natural Resources.

The NU Water Sciences Laboratory, established in 1990, is a world-class, state-of-the-art water research core facility that is an integral part of the NWC. Its highly trained faculty and staff use the latest in instrumentation for measuring chemicals in water, specializing in trace organics. It actively pursues development of new research methodologies and helps train new researchers.

Financial support for the NWC and its laboratory comes from a combination of state, local and federal funding, as well as through partnerships with NGOs and industry.

## Primary Goals:

NWC's primary goal is to help position NU as a state and national leader in teaching, research and extension education in water sciences, water management and water law and policy, and to serve Nebraska and all Nebraskans in these critical areas.



## Specific Goals:

Develop, facilitate, and implement research, teaching, and outreach programs in water sciences.

Expand financial resource base for NU water programs from private, non-governmental and governmental sources.

Establish and maintain collaborative linkages with state and federal agencies, industry, producers, and other water resource entities.

## Research Areas

- Impacts of climate and weather on water resources.
- Understanding and protecting water quality.
- Groundwater-surface water interactions.
- Improving water efficiency in crop production.
- Drinking water and wastewater quality and management.
- Ecosystems, ecology and adaptive management.
- Economic impacts of water management decisions.
- Human dimensions of water use.

## Examples of Water Research:

- Underground wireless sensor networks to measure soil moisture to reduce irrigation frequency.
- Simple and inexpensive process to treat groundwater contaminated with trichloroethylene (TCE), a very common and toxic groundwater contaminant.
- Mitigating effects of and reduce use of pesticides, pharmaceuticals and livestock supplements to improve surface and groundwater quality.
- Investigating the degree of connection between the Platte River and nearby groundwater.
- Cutting-edge research methods in remote sensing to detect and monitor lake water quality, including toxic algal blooms.
- Investigate the occurrence, distribution, vulnerability, and mitigation of small community water supplies related to groundwater uranium and arsenic.
- Improved water management through quantification of evapotranspiration.
- Irrigation efficiency studies such as subsurface-drip irrigation and use of decision-support tools.
- Regional leadership in global climate change research related to water.



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## New Management Arsenal:

In the midst of the worst drought in more than half a century, U.S. farmers are drawing on their best defenses — the center pivot and their experience dealing with some of the harshest conditions Mother Nature can deal. UNL is giving them a new tool for their irrigation management arsenal — one with the potential to decrease costs, conserve water, and improve yields. Mehmet Can Vuran, assistant professor of computer science and engineering, has spent years developing wireless underground sensor networks to give agricultural producers real-time information about soil moisture and changing conditions that would allow them to more efficiently manage irrigation.

## Making Every Day Count:

Agricultural water use is a high-stakes numbers game and Nebraska's agricultural producers are beating the odds, using technology education provided by UNL Extension. In Nebraska, as well as around the world, farmers are challenged with conservation and using water resources more efficiently while meeting crop water requirements to maintain high yields. The Nebraska Agricultural Water Management Network (NAWMN) was launched as a cooperative effort by UNL Extension, the Upper Big Blue Natural Resources District, growers in south central Nebraska and later, the Natural Resources Conservation Service. It has grown to a network of more than 800 producers throughout Nebraska, all using cutting-edge technology to determine when and how much to irrigate, so they can make every drop count.

## Water Optimizer:

With outlooks for drought and limiting irrigation continuing through much of Nebraska what can producers do? There are a number of tools available for producers and urban homeowners to help manage water resources. One is the Water Optimizer, a Microsoft Excel-based program that can estimate a profit-maximizing cropping mix based on a limited amount of water. The tool has several options allowing users to customize the model to reflect their farm.

## Global Crop Yields

About 30 percent of major global cereal crops — rice, wheat and corn — may have reached their maximum possible yields in farmers' fields, according to UNL research published in Nature Communications. These findings raise concerns about efforts to increase food production to meet growing global populations. Future projections that would ensure global food security are typically based on a constant increase in yield; a trend that this research now suggests may not be possible.

## Amazon Biodiversity

UNL paleoclimatologist Sherilyn Fritz is leading a large multidisciplinary team of North and South American scientists that recently won a five-year, \$4.4 million Frontiers in Earth-System Dynamics (FESD) grant from the National Science Foundation. They are studying how climate and geology interact to shape biodiversity in the Amazon and Andean forests through time.

## Information

The NWC uses an aggressive information and outreach program to communicate with colleagues, constituents and the public. The program includes annual conferences, colloquiums, tours, seminars and lecture series. Print publications include a quarterly newsletter reaching nearly 3,000 subscribers, along with fact sheets, brochures, briefing books for legislators, a state water map and more. Electronic versions of these are online at [watercenter.unl.edu](http://watercenter.unl.edu).

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