ILLINOIS WATER RESOURCES CENTER

ENHANCING WATER RESEARCH AND EDUCATION THROUGHOUT ILLINOIS

SINCE 2018

IWRC has provided

37 RESEARCH GRANTS (AVERAGING $204,170)

that have generated

51 PEER-REVIEWED PUBLICATIONS

and

5 UNDERGRADUATE QUALIFYING PAPERS, THESES, AND DISSERTATIONS

and has provided support to

36 UNDERGRADUATE, GRADUATE, AND DOCTORAL STUDENTS

The **ILLINOIS WATER RESOURCES CENTER** (IWRC) is a federal–state partnership whose aim is to plan, facilitate, and conduct research that helps resolve Illinois and regional water problems; promote technology transfer; promote the dissemination and application of research; train scientists through participation in research; and award competitive grants under the Water Resources Research Act. We conduct and facilitate novel and interdisciplinary water sciences research that benefits the people, economy, and environment of Illinois, the Mississippi River basin, and the Great Lakes region. The IWRC is dedicated to promoting transformative research and technological advances in water sciences using team-based strategies to tackle grand societal challenges through collaboration on national and international scales.

IWRC RESEARCH SUPPORTS

15 Water Technology and Innovation

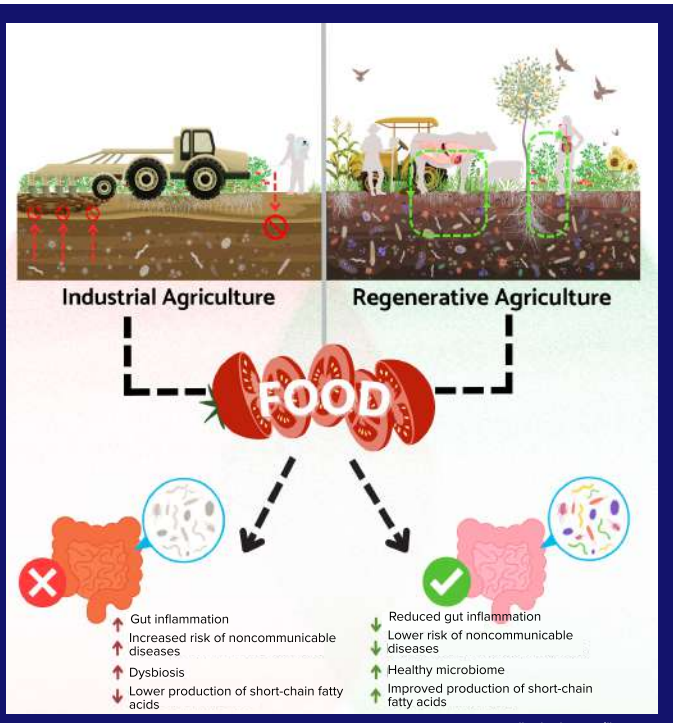
8 Watershed and Ecosystem Function

7 Water Quality

7 Water-Related Hazards and Climate

INCUBATING RESEARCH FOR THE FUTURE

The Coalition of Regenerative Agriculture, Food, and Health (CRAFH) is a transdisciplinary team working at the intersection of food, farm, and health to bridge siloed systems. Climate assessments suggest increasing climate variability in weather events places greater pressure on an imperfect agricultural system, stressed food system, and taxed soil. Challenges include heat and water stress, resulting in reduced crop yields and increased incidence of pests and diseases. Drastically changing climate coupled with overreliance on conventional agriculture will increasingly challenge decision making, manifesting as increased farmer stress and food insecurity in vulnerable low-socioeconomic populations. Novel solutions suggest strategically building an effective roadmap modifying human behavior and market/supply capacity. Regenerative agricultural practices offer the desired solutions of reducing nutrient/synthetic inputs, run-off, and carbon emissions while enhancing biodiversity, soil health, and food quality.



Source: Kelly Bloedorn, Basil's Harvest

Aesthetically, food may not give clues about the underlying agricultural practices used to grow them, but stark differences in soil quality between industrial agriculture (IA), left, and regenerative agriculture (RA), right, are likely to impact the health of the end consumer. RA practices prioritize the restoration and maintenance of soil health for improved plant production, leading to a healthier gut microbiome in humans. IA practices, often relying on synthetic inputs, have shown to negatively affect soil microbiome diversity, which may have secondary impacts on the human gut microbiome.

Microcystis, Scioto River, Delaware Co., Ohio. Photo credit: Eugene Braig, Ohio State University Extension.

The Algal Bloom Action Team (ABAT) is a 12-state team that partners Water Resource Research Institutes with Cooperative Extensions at each of the states' land-grant institutions to assess current harmful algal bloom (HAB) research, outreach, and education efforts. ABAT is a predominantly voluntary, ongoing, regional collaboration focused on gaining, sharing, and synthesizing knowledge on HABs to develop regional outreach products.

WATER–ENERGY NEXUS

Research aimed at developing reliable, sustainable, cost-effective solutions for water–energy security and resilience is one of the new focus areas for IWRC.

GEOEXCHANGE

Researchers are advancing the integration of geothermal energy and groundwater resources. The rapidly growing geothermal energy research program at the University of Illinois is bringing together an international consortium of researchers, practitioners, and industrial partners to address technical and economic issues related to the deployment of low-temperature geoexchange energy systems, including the role of groundwater in improving the technological performance and its role in underground thermal energy storage.

DEEP DIRECT USE

Researchers in Illinois are advancing direct-use technologies for space heating and cooling and water heating because of the state's favorable deep groundwater conditions and weather patterns. Current projects include investigating the feasibility of tapping the vast geothermal energy resources deep in the Illinois Basin for district- or community-scale thermal energy networks. If successful, this technology could be applied in other Midwest sedimentary basins, offering a sustainable and reliable energy source.

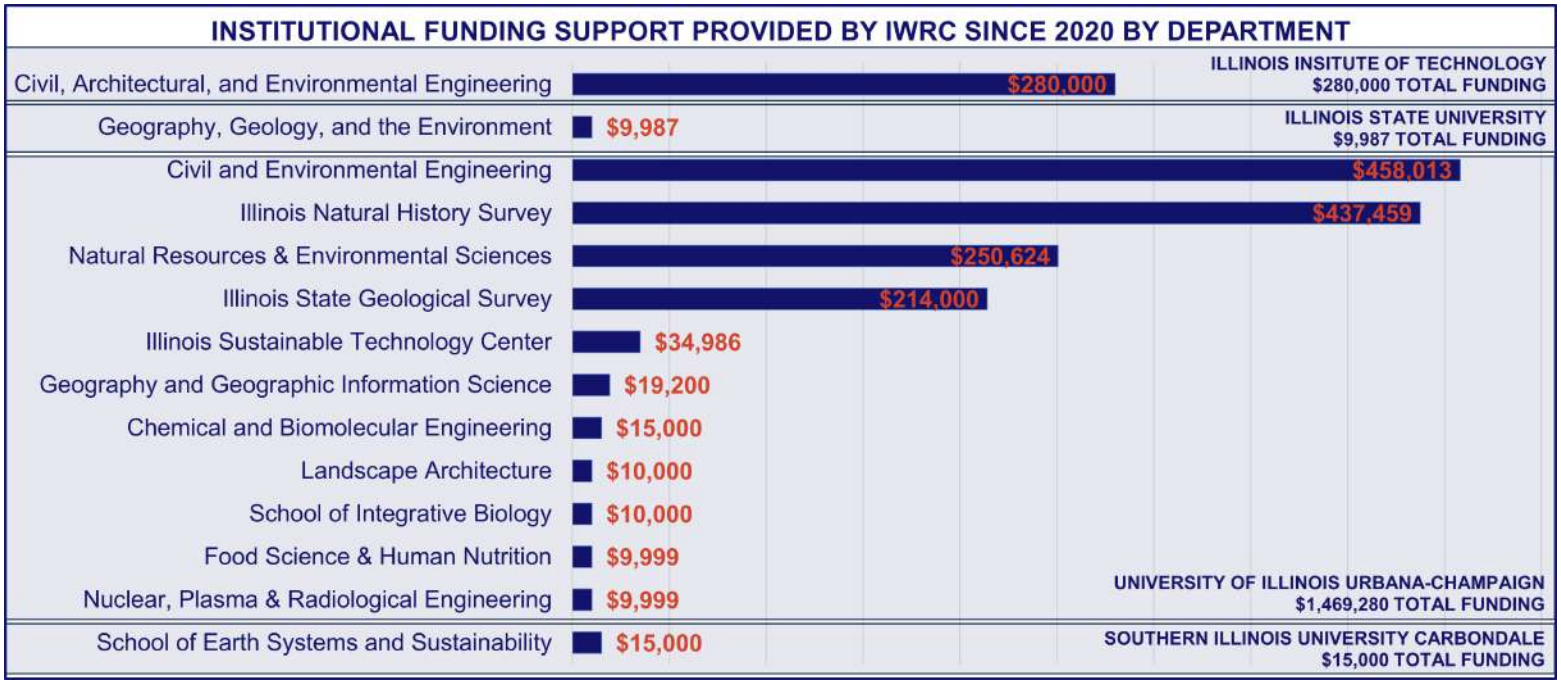
ONGOING GEOTHERMAL ENERGY RESEARCH

- Collaborating with the U.S. Geological Survey on the development of new heat transport functions for current groundwater flow models.
- Evaluating the thermal properties of geologic materials under various subsurface conditions, which is critical for designing vertical borehole heat exchangers and reducing the cost of installing geothermal heat pump systems.
- Investigating the performance of energy foundations for sustainably heating and cooling newly constructed multi-floor buildings.
- Collaborating with Department of Energy National Laboratories on the development of innovative geothermal technologies (e.g., thermal underground batteries).
- Collaborating with the Army Corps of Engineers on enhancing water–energy security and resilience.
- Partnering with University of Illinois Extension to provide outreach and education for geothermal energy.

IWRC'S PRIORITIES FOR FUTURE INITIATIVES

- Artificial intelligence applications for water resources research
- Ecohydrology and public health in urban settings
- Social and environmental justice in water resources management
- Synergy across multiple-scale spatiotemporal complex systems

IWRC SUPPORTS RESEARCH THROUGHOUT ILLINOIS



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