Water Wealth, Water Woes

Director Anders W. Andren
Phone (608) 262-0905 Web www.wri.wisc.edu

Wisconsin has a wealth of water. Nearly a million acres of lakes, over 5 million acres of wetlands, about 32,000 miles of perennial streams and 6.4 million acres of Lakes Michigan and Superior lie within its borders. Beneath its surface lies an estimated 1.2 quadrillion gallons of groundwater, from which 70 percent of the state's population draws its drinking water via 12,000 public water systems and 800,000 private wells. Another 12,000 high-capacity wells support the operation of factories, farms and breweries.

Ensuring a sustainable supply of safe, high-quality water is of fundamental importance to the present and future health of the economy, environment and people of Wisconsin, yet our water wealth is diminishing. The state's populous Fox River Valley, Milwaukee-Waukesha area and metropolitan Madison are confronted with serious declines of groundwater levels ranging from 60 to 450 feet. Unacceptably high levels of arsenic have been detected in public and/or private drinking water supplies in nearly half of the state's 72 counties. Over 40 tons of PCBs contaminate Lower Fox River sediments, hundreds of pounds of which continue to contaminate Lake Michigan's Green Bay annually. Wisconsin's fish consumption advisory now includes a mercury contamination warning for all inland waters statewide. Unacceptably high levels of nitrate plague 15 municipal water systems and 10 percent of private wells.

Addressing these issues is the mission of the **University of Wisconsin Water Resources Institute** (WRI). The WRI promotes research, training and information dissemination on state, regional and national water resource problems. It is the focal point for water resources research, education and outreach within the UW System, fostering strong collaborative research efforts by linking university scientists with state water managers and users statewide.

About the WRI

The WRI is part of the **Water Resources Research Institute (WRRI) Program**, a federal-state partnership of research, outreach and education dedicated to solving state, regional and national water problems. One of 54 Water Resources Research Institutes nationwide, the WRI is the gateway to federal WRRI grants for Wisconsin colleges and universities. While WRI base funding from the U.S. Geological Survey, U.S. Department of the Interior, totals less than $100,000 per year, every federal dollar must be matched with at least two nonfederal dollars. All WRRI grants are awarded on a competitive, peer-reviewed basis.

WRRI funds are leveraged with additional funding from the **UW System Groundwater Research Program**, part of **Wisconsin's Groundwater Research and Monitoring Program**. The faculty of any UW System campus (see map) are eligible to apply for this funding. Guided by the Wisconsin Groundwater Coordinating Council, this program is the mechanism whereby the UW System and the state departments of Natural Resources, Commerce, and Agriculture, Trade & Consumer Protection pool limited state and federal resources to support a coordinated, comprehensive and multidisciplinary response to the state's critical water resource issues. Together, these programs have helped establish the University of Wisconsin as a national leader in groundwater research. >

ISSUES

- **Critical water resource problems in Wisconsin include high arsenic levels in drinking water and severe drawdowns of groundwater levels in the Fox River Valley and southeastern Wisconsin. Nitrate contamination of groundwater plagues some parts of the state, while mercury contamination is a growing concern for surface waters statewide.**
- **The UW Water Resources Institute supports vital research on groundwater and surface water supply and quality issues, wastewater treatment and disposal, watershed management, pollution remediation, and related public health issues.**
- **WRI projects provide training and financial support for more than two dozen undergraduate and graduate students annually. The WRI also supports the UW-Madison Water Resources Library, a nationally unique collection of 30,000 volumes of water-related information.**
- **WRI research, outreach and education are funded by the federal Water Resources Research Institute Program and the Wisconsin Groundwater Research and Monitoring Program.**

Water Resources Research

The WRI annually funds an average of 15 short-term research projects of either a fundamental or applied nature that typically involve about 50 faculty, staff and students at a half-dozen campuses around the state. By supporting short-term projects, the institute is able to quickly respond to issues as they emerge.

The WRI research encompasses four broad areas: groundwater, surface water, groundwater-surface water interactions, and drinking water. Groundwater quality and quantity issues generally receive top priority. Other topics of emphasis include mercury contamination of surface waters and arsenic in drinking water supplies. Recent examples of WRI-funded research include:

- Investigating the causes of changes in groundwater recharge rates in southeast Wisconsin and developing groundwater recharge estimates for a groundwater flow model for that region.
- Exploring noninvasive geophysical methods for quickly and inexpensively identifying aquifers susceptible to contamination.
- Evaluating raingardens—sunken gardens that collect stormwater runoff—as a way to reduce runoff and enhance groundwater recharge in urban areas.
- Participating in a landmark study at the Experimental Lakes Area in Ontario, Canada, to determine the movement, methylation and bioaccumulation of mercury in aquatic ecosystems and how atmospheric inputs affect mercury concentrations in fish.
- Developing an inexpensive, high-performance photoactive adsorbent for the simultaneous removal of two of the most toxic forms of arsenic from groundwater.

Outreach and Information Transfer

WRI research and other water-related information is readily accessible via a Web site (*www.wri.wisc.edu*) and the Water Resources Library (WRL), a nationally unique collection of documents covering every major water resource topic. The library's catalog is available online and searchable via the Internet, making the WRL a national and global resource. Thousands of WRL documents are loaned annually.

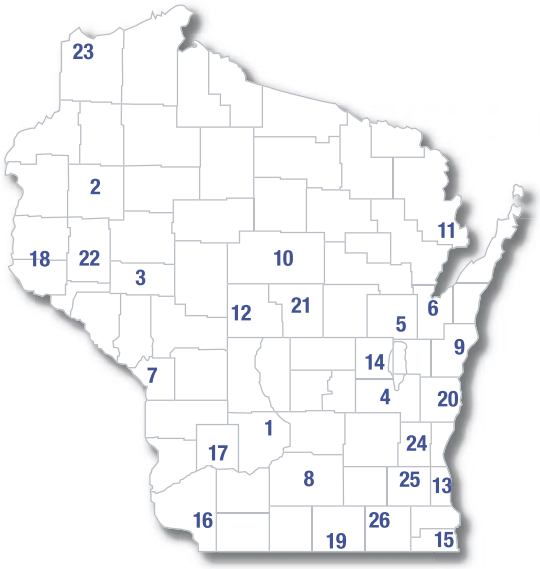
The WRI was a major sponsor and active participant in Wisconsin's 2003 "Year of Water" observance. As part of that observance, the WRL became the first academic library in the state to make its collection available online to the public when it developed "Wisconsin's Water Library" (*www.aqua.wisc.edu/waterlibrary*), which permits Wisconsin residents to check out WRL books and other documents free of charge via their local libraries.

Student Education and Professional Training

Each year, WRI provides 25 to 30 graduate and undergraduate students in the UW System with opportunities for training and financial support while they work toward their degrees. During 2003, a total of 43 students (24 undergraduates, 11 master's degree students, six Ph.D. students and two post-doctoral students) received WRI support.

The WRI also helps organize and cosponsors state and regional conferences on water issues, such as the annual conference of the Wisconsin Section of the American Water Resources Association, which is regularly attended by 200 water resource managers, professionals and students from throughout the state.

UW System Campuses Eligible for WRI Funding



1. UW-Baraboo/Sauk County
2. UW-Barron County
3. UW-Eau Claire
4. UW-Fond du Lac
5. UW-Fox Valley
6. UW-Green Bay
7. UW-La Crosse
8. UW-Madison
9. UW-Manitowoc
10. UW-Marathon County
11. UW-Marinette
12. UW-Marshfield/ Wood County
13. UW-Milwaukee
14. UW-Oshkosh
15. UW-Parkside
16. UW-Platteville
17. UW-Richland
18. UW-River Falls
19. UW-Rock County
20. UW-Sheboygan
21. UW-Stevens Point
22. UW-Stout
23. UW-Superior
24. UW-Washington County
25. UW-Waukesha
26. UW-Whitewater

The UW Aquatic Sciences Center

The WRI is part of the UW Aquatic Sciences Center on the UW-Madison campus. The center is home to the Water Resources Library, a collection of nearly 30,000 volumes of water-related information available to UW faculty, staff and students; K–12 teachers; private consultants, and state and federal government officials.

The Aquatic Sciences Center also houses the UW Sea Grant Institute, part of another federal-state partnership of 30 university programs that promote research, education, and outreach on Great Lakes and ocean resources. This unique administrative union of Wisconsin's federal Water Resources Research Institute and Sea Grant programs enables the UW Aquatic Sciences Center to address the full range of water-related issues in Wisconsin, from surface water to groundwater, from the Mississippi River to the shores of Lakes Michigan and Superior.