



## Science at the Grassroots Level

### West Virginia Water Research Institute Expands Ohio River Basin Water Monitoring Program

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Although not nearly the industrial power house it once was, the Upper Ohio River Basin is still home to many coal mines, coal-fired power plants, natural gas wells, industrial wastewater treatment plants, and brownfield sites—each posing potential water quality concerns. The recent boom in hydraulic fracturing during natural gas well drilling has added another variable when it comes to monitoring rivers and streams for potential sources of pollution. While threats to the region's water quality continue to loom, newer and more innovative approaches are being taken to better understand and monitor water resources.

The West Virginia Water Research Institute (WVWRI), a program of the National Research Center for Coal and Energy (NRCCE) at West Virginia University, has spearheaded these efforts and is currently embarking on a quest to better understand water quality for an entire region.

### Water Quality Concerns in the Mon

In 2008, after incidents of increased levels of total dissolved solids (TDS) in the Monongahela River, WVWRI initiated a water quality monitoring program to identify what might be causing changes in the river's water chemistry and to disseminate water quality information to the public. This original program, called the Monongahela River Water Quality Study, was funded by the U.S. Geological Survey and included a bi-weekly monitoring effort. While in the field, WVWRI technicians record field parameters and collect samples that undergo a thorough chemical analysis in a state-certified laboratory.

The monitoring focused exclusively on the mainstem of the Monongahela River and at the mouths of some of its major tributaries. In all, 16 locations were monitored along the river's 128-mile stretch (see map on page XX). While the resultant data proved beneficial in determining TDS loadings in the Monongahela River, additional water quality data was needed from the river's headwater streams and tributaries to provide a better understanding of the river basin's overall health.

Collecting enough data to provide an adequate water chemistry baseline for an entire river basin, however, would require a small army of field technicians. To address this, WVWRI adopted a collaborative approach to water quality monitoring and implemented a new and unique water quality monitoring model known as QUEST, an acronym for Quality Useful Environmental Study Teams.

### A QUEST for Water Quality Data

In 2010, after successful implementation of the Monongahela River Water Quality Study, WVWRI secured funding from the Colcom Foundation, a Pittsburgh-based organization dedicated to fostering a sustainable environment, to expand the Monongahela River QUEST program. In addition to covering a larger geographic scope, the QUEST program allowed for the incorporation of water quality data collected by local watershed organizations. This data supplemented the chemical analysis being undertaken by WVWRI and provided a much more thorough analysis of the entire Monongahela River Basin.

### QUEST Program Expands

In 2012, the Colcom Foundation provided a \$700,000 grant to expand the program once again to include areas surrounding the Monongahela River, Allegheny River, and Ohio River. Now called 3 Rivers QUEST, or 3RQ, the program



Water samples are collected in bottles such as these by 3 Rivers QUEST researchers while in the field. The samples are taken to a state certified laboratory where they undergo a rigorous chemical analysis.

monitors the rivers, tributaries, and headwater streams covering an area of approximately 25,000 square miles and portions of five states. Staying true to the QUEST model, 3RQ includes a network of researchers at WVWRI and partner organizations: Duquesne University, Wheeling Jesuit University, and the Iron Furnace Chapter of Trout Unlimited, as well as more than 20 volunteer organizations within the Upper Ohio River Basin. In August 2013, the 3RQ program received an additional \$500,000 Colcom Foundation to support the program until 2015.

All of the data collected by both the research partners and volunteer organizations is stored in a database. Using an interactive mapping platform, this information is available to the public via the program's website ([www.3RiversQUEST.org](http://www.3RiversQUEST.org)) which is then seen and used by federal and state agencies, researchers, industries, and citizens.

### 3RQ Mini-Grant Funding

One of the ways that the 3RQ program is assisting grassroots water quality monitoring efforts is its 3RQ Mini-Grant Program. In May 2013, \$140,000 was distributed to 23 volunteer watershed organizations consisting of more than 350 volunteers. This funding assists grassroots water quality monitoring efforts by providing funds to purchase monitoring equipment, such as conductivity pens and data loggers, and supports staffing needs.

Participating volunteers collect basic parameters such as conductivity, pH, and water temperature, with all of their results uploaded to the 3RQ database where it is stored and displayed on an interactive online map. This data, in conjunction with more in-depth laboratory analysis from sites monitored by WVWRI and its 3RQ partners, provides a useful baseline for water chemistry data around the region.

### Conclusion

Monitoring water quality across the entire Ohio River Basin is no small feat. Understanding the data is even more daunting. The 3RQ team is working hard to combine expansive water quality data with online mapping. Together, these factors start to answer the fundamental questions about variations in water chemistry across the basin.

One of the first steps to protecting water quality is understanding the sources of contamination. Environmental litigation, intelligent policy-making, and adequate health precautions all depend on establishing causation. In other words, establishing sources of contamination are just as important as detecting the contamination in the first place. While there is still plenty of room for improvement, projects like the 3RQ are making strides in tackling this challenge.

Additional information on the 3RQ can be found at [www.3RiversQUEST.org](http://www.3RiversQUEST.org) or by contacting 3RQ Program Manager, Melissa O'Neal at [moneal@mail.wvu.edu](mailto:moneal@mail.wvu.edu).

Jason Fillhart, an environmental technician with the West Virginia Water Research Institute (WVWRI) at West Virginia University, uses a highly sophisticated YSI instrument to record field parameters while monitoring for the 3 Rivers QUEST program at Valley Falls on the Tygart Valley River in West Virginia.

