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Profile: The River Alert Information Network (RAIN): Making Regional Drinking Water Collaboration Work

By Ellen Kiley and Julie Kollar

RAIN's *From the River to the Tap: What you can do to Keep it Clean* 2011-2012 WREN Project has been busy holding public education events, reaching out to new partners, working on its website (www.3rain.org), and deploying additional water quality monitoring stations in regions where natural gas drilling in the Marcellus shale is active. The River Alert Information Network (RAIN) coalition has made great progress since holding its first public awareness events back in August 2007 with a small amount of seed funding from WREN, promoting the benefits of establishing an early warning spill detection system on the Allegheny, Monongahela, and Youghiogheny rivers.

Although many people are aware of threats to area waterways and drinking water, they often mistakenly assume that contaminant detection equipment is automatically placed for public water systems that draw off rivers or streams. RAIN undertook the challenge to educate the public about the gaps due to a lack of monitors that provide real time data, and outlined its vision for a new robust monitoring network. Ever since one audience member spoke up saying, "Well, this is a no-brainer," and the crowd nodded in agreement, the RAIN coalition has worked tirelessly to cobble together a drinking water warning network in southwest Pennsylvania. The focus of RAIN's current WREN grant project is to provide the public with opportunities to understand the "big picture" regarding threats to public drinking water sources, including natural gas development activities and abandoned mine drainage, and offer solutions that can be implemented in the region.

The River Alert Information Network (RAIN) is a regional Source Water Protection program that covers the Ohio River Basin and helps protect the drinking water of approximately 2 million people. Its primary focus is the implementation and maintenance of an Early Warning System (EWS) of water quality monitoring sites along the Allegheny, Monongahela, and Ohio rivers, and their tributaries. These monitoring sites track water quality in near-real time and send electronic updates to RAIN, which notifies its members downstream of potential problems and archives the data for future study. In addition to the monitoring network, the other principal components of the EWS include a notification system, the early warning partnership that connects upstream and downstream members, and a web-based database and portal.

In October of 2008, the Environmental Protection Agency and the PA Department of Environmental Protection received reports of high concentrations of Total Dissolved Solids (TDS) and sulfates in the waters of the Monongahela River. Sulfates and TDS are naturally occurring substances found in minerals, soil and rocks, but may also be discharged to rivers and streams through mine drainage, gas well drilling or sewage treatment plants. Total dissolved solids (TDS) are a measure of dissolved matter in water.

These solids may be organic or inorganic and are smaller than two micrometers (1/50th the width of a human hair), making them impossible to see with the naked eye.

Sudden spikes in TDS can be caused by agricultural, mining or residential runoff, oil and gas drilling, or by industrial or sewage discharges. In excess of 500 milligrams per liter, these invisible contaminants make drinking water smell or taste bad. TDS is not a primary pollutant, but it affects the aesthetic qualities of drinking water and is a potential indicator of chemical constituents in streams and ground water. Elevated TDS levels may reduce the effectiveness of treatment for other contaminants. TDS can be toxic to aquatic life through increases in salinity or changes in the composition of the water. High levels of TDS can also cause damage to the filtration systems that clean drinking water, or to other industrial machines.

In fact, the first complaints the EPA had about area water quality were not from water suppliers or consumers, but from Allegheny Energy Supply Company and the Clairton Coke Works. Given the numerous potential sources of high-TDS wastewater, including mines (active, inactive, and abandoned), landfills, food processing, wastewater treatment plants, water softeners, and oil and gas extraction, it proved difficult to determine the precise origins of elevated TDS levels, as significant mining has long been and will continue to be a major water quality issue in the watershed. Nonetheless, many believe the 2008 TDS crisis was caused by large quantities of hydrofracturing flowback water released into the river after treatment at sewage plants (which did not remove dissolved solids) along with mine drainage, exacerbated by low-flow drought conditions. The immediate problem was solved by restricting these discharges; and subsequent changes to DEP's permitting regime for TDS, but the need for more and better monitoring of water quality was made very clear.

In response to this crisis, the EPA and PA DEP provided initial funding for RAIN. In the beginning, the network consisted of thirty-three public water suppliers and fourteen monitoring sites within Pennsylvania. One each was located on the Allegheny, Shenango, Youghiogheny, and Ohio Rivers, while the troubled Monongahela River and its tributaries received ten monitors. In early 2012, West Virginia joined the Network with ten monitoring sites along the Upper Monongahela with the help of grants provided by the EPA and the West Virginia Department of Health and Human Resources. By the end of 2012, there will be a total of 29 monitoring sites and 47 actively participating public water suppliers.

Total dissolved solids are not the only pollution threat facing the Ohio River basin. Bromide levels rose in 2010 in the Mon, and remained at higher levels than expected for inland waterways. Bromide in fresh water is typically found in areas influenced by saltwater intrusion or another bromide source (well drilling brines, industrial chemicals and agricultural chemicals). These nontoxic salt compounds can react with natural organic matter and water treatment disinfectants like chlorine, used to kill disease-causing organisms, to form brominated trihalomethanes (THMs), also known as disinfection by-products (DBPs). DBPs become part of the drinking water, and studies have shown links between ingestion of DBPs and several types of cancer and birth defects. It is important to balance protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts.

Combined sewer overflows caused by stormwater runoff, chemical spills, mine drainage and a host of other possible sources of contamination constantly challenge drinking water from the busy rivers, which are still a vital part of the region's industry. RAIN's Early Warning System for monitoring river water quality protects the investment that communities all throughout the basin have made in their public water supplies. A modest $10,000 testing array (the estimated cost of installing a water quality monitoring panel) protects not only the treatment facility that hosts it, but also every linked facility downstream, guarding millions of dollars worth of machinery that supports the region's economy from possible damage and

contamination. The system offers additional smaller cost benefits, as water treatment facilities are able to fine-tune their processes and not over-treat the water, which saves money.

Looking ahead, RAIN is seeking to expand its capabilities as an Early Warning System in the near future through a "Campaign for Expanded Water Quality Monitoring." Funds raised through this campaign will be used to purchase sensors to monitor Dissolved Oxygen, Turbidity, and Ammonia, among other indicators. The new sensors will also detect oil and grease spills, which pose a particular problem for water suppliers on the Monongahela River.

An important part of any Source Water Protection plan is education -- members of the public who live in the Ohio River Basin need to understand the ways in which their drinking water might be at risk, how they can help, and the important steps being taken to protect that valuable asset. To that end, WREN provided a 2011-2012 grant to RAIN to produce educational materials that are being developed in conjunction with California University of PA, and will be shared on RAIN's website.

RAIN is both a volunteer and a voluntary organization. Public water suppliers must elect to join to be added to RAIN's alert list. The board members, staff of member public water suppliers or of RAIN's partner organizations (see below) volunteer their time and expertise on issues of water quality testing, data retrieval and storage, grant administration and more. Tom McCaffrey, Geologic Specialist at the PA DEP Southwest Region Office, has provided effective support to the coalition since its inception.

Please visit RAIN's comprehensive website at www.3rain.org for constant updates on the water quality of the Ohio River Basin and a full list of actively participating community water suppliers. RAIN is a partnership of the following organizations: Riverside Center for Innovation, PA DEP, Carnegie Mellon University, California University of PA, University of Pittsburgh, WaterQuest, Carnegie Science Center, WV Department of Health and Human Resources, PA Rural Water Association, and WV Rural Water Association.