Northeast-Midwest Institute Study Identifies Water Monitoring Needs for Detecting Effects of Shale Gas Development in the Susquehanna River Basin

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A new study released today by the Northeast-Midwest Institute and the U.S. Geological Survey found that, even after 8 years of intense shale gas development in the Susquehanna River Basin, current water quality monitoring is inadequate for detecting potential surface water or groundwater quality impacts of shale gas development activities in the basin. Water monitoring to measure the effect of new industries on water resources requires targeted sampling plans and relevant monitoring parameters to detect water quality impacts from emerging technology. "*Because they were selected to meet other monitoring objectives, the existing long-term monitoring sites in the Susquehanna River Basin are not in the right locations and do not collect the right data to detect water quality change related to shale gas development*" stated **Elin Betanzo, lead author of the study**. The report did find that newer surface water monitoring programs in the Susquehanna River Basin are collecting water data in the right locations to detect changes related to shale gas development, but additional parameters, increased sampling frequency, long-term data collection, and continuous streamflow data are needed to be able to detect relevant surface water quality trends. Ms. Betanzo further noted that "*the amount of data available through public data sharing systems for detecting changes in groundwater is even more limited than surface water data*". The study presents several strategies for collecting the water data needed to detect whether shale gas development is contaminating surface water or groundwater in the Susquehanna River Basin.

Hydraulic fracturing and shale gas development in the Marcellus shale of Pennsylvania has taken off in the past decade. The number of unconventional wells grew from less than 200 in 2007 to more than 9,300 as of August 2015. Along with this new growth comes concern about potential water quality impacts of the relatively new technique of high-volume hydraulic fracturing (HVHF) and the cumulative effects of shale gas development on the environment as development activities have moved into minimally developed areas, especially in the headwaters of the Susquehanna River Basin.

"*This report by the Northeast-Midwest Institute points out how difficult it is for the public to access water data to answer questions about whether shale gas development in the Susquehanna River Basin impacts water quality, and it takes a hard look at available water data for identifying potential problems*," said **Dr. Susan Brantley, head of the Shale Network at Penn State University**. "*This report lays some of the groundwork for designing targeted approaches for surface water and groundwater monitoring programs in the Susquehanna River Basin.*"

The study calls for increased monitoring in watersheds with a high density of active HVHF wells and a new systematic, long-term groundwater monitoring program for detecting water quality change related to shale gas development in freshwater aquifers that underlie the Susquehanna River Basin. Coordination among water monitoring organizations, the shale gas development industry, and local citizens is essential to efficiently collect the data needed to track any water quality changes in the Susquehanna River Basin.

The study presents important findings regarding existing water data in the Susquehanna River Basin:

- Existing surface water data are insufficient to detect water quality change related to shale gas development. Out of approximately 14,700 surface water monitoring sites in the Susquehanna River Basin, only 10 monitoring sites have enough barium data (an indicator associated with HVHF development) for a water quality trend analysis, and none of these sites are located in watersheds with a substantial number of active HVHF wells; few of the 26 recommended surface water monitoring

parameters are available for monitoring sites with a long-term data record.

- Recent targeted monitoring programs through the Susquehanna River Basin Commission and Pennsylvania Department of Environmental Protection are monitoring in appropriate locations, but additional sampling frequency, parameters, and streamflow data are needed before water quality trends can begin to be detected.
- Publicly available groundwater quality data in the Susquehanna River Basin are not sufficient to identify water quality change related to shale gas development and are not adequate to serve as the foundation of a new monitoring program.

The study also presents recommendations for immediate action:

- Increase sampling frequency at a subset of targeted surface water monitoring sites and maintain long-term monitoring, collecting the full suite of priority surface-water parameters and streamflow at each monitoring site. The incremental cost estimates for increased surface water monitoring and data analysis range from $720,000 to $1.7 million per year, a small percentage of the value of these water resources to the region.
- Design and implement a systematic, long-term groundwater monitoring program for detecting groundwater quality change related to shale gas development in the Susquehanna River Basin, building on data collected by shale gas development companies if appropriate. The cost estimates for implementing this groundwater monitoring program, including data analysis, range from $362,000 to $524,000 per year for the Susquehanna River Basin.
- Establish a coordinating entity to develop and implement surface water and groundwater monitoring plans in the Susquehanna River Basin, with representation from water monitoring organizations, shale gas industry, domestic well owners, and citizens.

The Northeast-Midwest Institute will present the study findings in a webinar at 11:00 am EST on February 11, 2016. Click here to register for the webinar. The Northeast-Midwest Institute will host a Capitol Hill briefing on April 20, 2016 in the U.S. Capitol Visitor Center to share the findings and policy perspectives on the study. Download the full report and sign up for announcements about future reports at www.nemw.org.

Next steps in this project

Today's report is the second in a series of three reports evaluating the availability of water data needed to address urgent water policy issues. The first report in this series examined the water data needed to measure the effectiveness of agricultural management practices in the Lake Erie drainage basin. The Northeast-Midwest Institute will continue these investigations by exploring the water-quality data available across the entire Northeast-Midwest region and the types of policy questions these data can inform in a third, State of the Region report to be released in late 2016.

About the Northeast-Midwest Institute

The Northeast-Midwest Institute is a non-profit nonpartisan research, education, and policy organization dedicated to economic vitality, environmental quality, and regional equity for Northeast and Midwest states.

About the U.S. Geological Survey National Water Quality Assessment Program

Information about the National Water Quality Assessment Program can be found at http://water.usgs.gov/nawqa.