NARDeP
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REGIONAL WATER MANAGEMENT INSTITUTIONS AND UNCONVENTIONAL GAS DEVELOPMENT IN THE NORTHEAST/NORTH CENTRAL U.S.

Policy Issues and Options

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SUMMARY

Unconventional technologies for shale gas extraction depend on water as an input and produce many water-related outcomes. Water management institutions and regulations direct firms' water use and influence the magnitude and pattern of environmental and economic impacts from shale development. This policy brief identifies features of multi-state river basin institutions in the Northeast and the North Central U.S. that govern water use for the development of shale gas through unconventional extraction methods. This brief assesses these institutions' effects upon private and public decisions, resulting outcomes in the Marcellus shale and Utica shale regions, and highlights public policy issues and challenges.

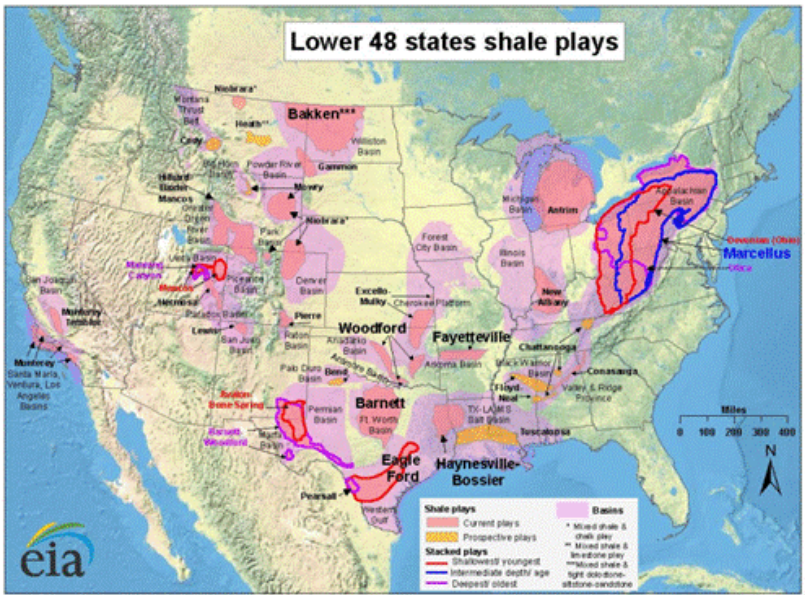

Figure 1. Location of the Marcellus Shale and Utica Shale. Source: U.S. Energy Information Administration.

Extracting natural gas from shale through unconventional methods (e.g., hydraulic fracturing or "fracking") presents opportunities and challenges to the Northeast and North Central (NE/NC) U.S. The Marcellus shale and Utica shale lies below parts of Pennsylvania, West Virginia, Maryland, New York, Ohio, and Virginia (Figure 1). While numerous shale formations are under development in the U.S., the Marcellus shale and Utica shale are especially valuable due to their size and location near major population centers with significant energy demands. The application of unconventional gas extraction methods in the NE/NC region began in the mid-2000s and provides striking evidence of the large economic benefits from such development as well as landscape, environmental, social, and other changes. Developing these natural resources presents a challenge in relation to water management.

The first unconventional shale gas wells were drilled in 2005; drilling escalated around 2010. By the end of 2013, more

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than 10,000 unconventional wells have been drilled into the Marcellus, Utica, and upper Devonian shale formations over vast areas of Pennsylvania, West Virginia, and Ohio. (See Figure 2.) Not all of these have been fracked, however.

Water is a critical input into and output (e.g., wastewater) from hydraulic fracturing. Large freshwater supplies are available in the Ohio River, Susquehanna River, and the Delaware River watersheds (Figure 3). However, this new water use has raised questions about impacts to water availability, particularly in smaller tributary streams or during low flow periods; potential water quality impacts from drilling and from transportation and pipeline construction; and reuse/treatment or disposal of return flows and wastewater. While the wells are far deeper than those typically used for drinking water, methane gas migration and impacts on drinking water are continuing concerns expressed by people living near hydro-fracking sites.

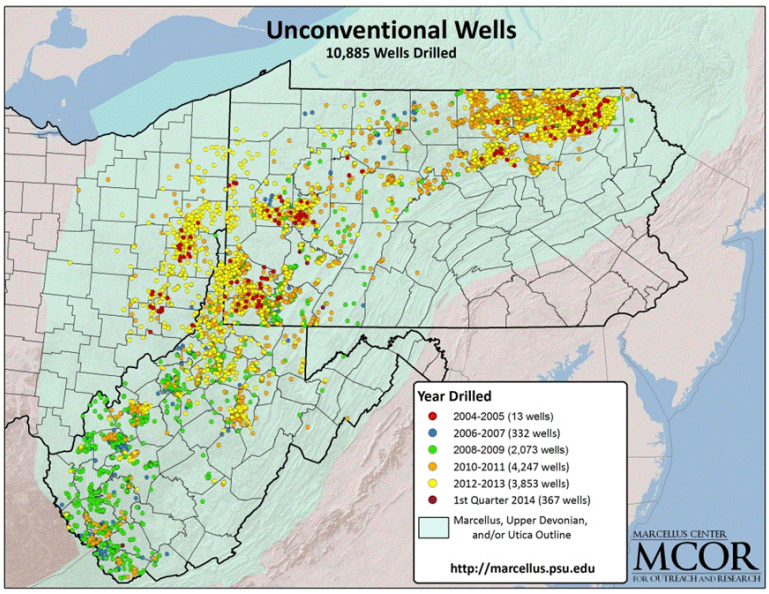

Figure 2. Unconventional Shale Gas Wells Drilled in OH, PA, and WV: 2004 - mid-2014.

Shale gas development has challenged water management institutions. Among the questions are: which agency (or agencies, and/or government level) regulates shale gas drilling; and which agency provides the resources for investigation of possible impacts and monitoring of water?

State environmental agencies oversee hydro-fracking and many aspects of water management related to this activity. This is because the 2005 federal Energy Policy Act excluded fracking from the definition of "underground injection," as covered by the Safe Drinking Water Act (SDWA). This portion of the SDWA protects belowground drinking water from contamination by underground injection. Moreover, state environmental agencies oversee hydro-fracking and many aspects of water management. An exception is the U.S. Environmental Protection Agency's (EPA) program under the federal SDWA for regulation of certain types of deep underground injection wells that may receive wastewaters from shale gas extraction. Also, EPA is studying the health and environmental safety of shale gas extraction, including a Congressionally mandated investigation into the potential impacts of fracturing on drinking water resources.

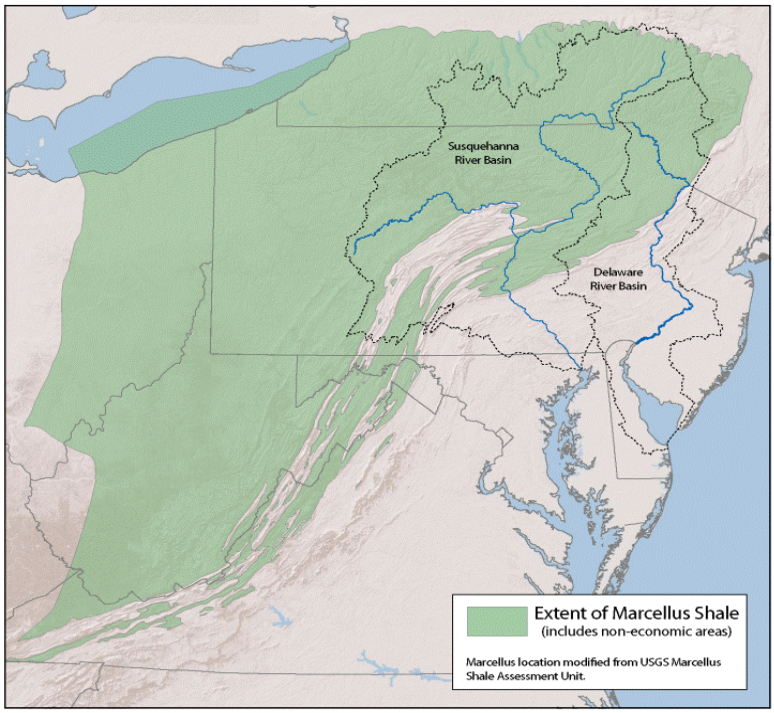

Figure 3. Location of the Marcellus Shale and Utica Shale Relative to Selected Major River Basins in the NE/NC U.S.

MULTI-STATE WATER MANAGEMENT INSTITUTIONS

River basins are a scale at which different jurisdictions are interconnected and the potential exists for both gains and losses from decision-making. Given the rapid increase in shale gas exploration and potential for adverse water impacts, multi-state water institutions can play an important role in managing water resources.

Interstate compacts are legal agreements between states to resolve an issue that extend beyond a state's boundary. Such compacts enable states to act together to devise solutions for matters that are beyond an individual state's jurisdiction, but which are not within the federal government's immediate purview. As of 2007, 22 such commissions addressed water and related concerns. The Delaware River Basin Commission and the Susquehanna River Basin Commission are among the four in which a federal representative has the authority to vote on commission decisions.

Multi-state water management through entities such as basin commissions has influenced the timing and pattern of shale gas development, including gas well permitting, gas well drilling, and production. Therefore, in addition to influencing water quantity and quality within the region, the decisions of multi-state water management institutions are affecting the magnitude and distribution of economic and related impacts of shale gas development.

Seven multi-state institutions with various powers exist in the NE/NC U.S. This policy brief focuses on three water basin areas with significant shale gas reserves as shown in Figure 3. The Susquehanna River Basin Commission addresses water quantity, the Delaware River Basin Commission addresses both water quality and quantity, while the Ohio River basin does not have a commission.

KEY POLICY ISSUES CONCERNING INTERSTATE RIVER BASINS AND SHALE DEVELOPMENT

These three river basins offer an interesting comparison because of the different approaches to governance, and to regulating the development of shale gas through hydraulic fracturing. Each has a set of issues related to it, including questions of scale and scope, governance, and funding.

SCALE AND SCOPE

There are sets of policy issues related to the appropriate boundary or management jurisdiction, as well as the scope of the river basin commissions. When Congress created the river basin commissions, the focus was on the river basin hydrologic unit as a scale. While this boundary selection may be ideal from a water quantity and quality standpoint, it ignores other natural resource boundaries such as shale formations.

The scope of the existing river basin commissions also creates a policy challenge. For example, the Commissions were created at a particular time with certain goals from that period in mind (e.g. flood control, recreation). With the advent of unconventional shale gas development, stakeholders have been raising questions about both the scale and scope of the Commissions. These questions include why the Commissions regulate water differently, including quantity, quality, and long-term effects; why the water resources of some areas are not regulated by interstate water commissions at all; and whether the water resources in some areas are more vulnerable to damage than others from shale gas extraction.

GOVERNANCE

Another set of policy issues relates to who governs the interstate water management bodies. In states without river basin commissions, state legislatures and agencies have most of these powers. Where an interstate compact has been signed, however, governance is much more complicated. For example, the federal government is a partner and has a formal vote in decisions of the Delaware and Susquehanna River Basin Commissions. The states have equal representation on the voting boards despite differences in the proportion of water resources within their formal state jurisdictions. Some have asked whether the rules of representation and decision-making promote sound decision-making or management of different interests among the states. Additional questions that have arisen in the debate over shale gas development include:

- Is there adequate consideration of upstream and downstream parties' interests?
- Do the mechanisms that the commissions have developed for decisions allow for the timely development of the shale gas resource by the industry and landholders?
- Are the means for public input and participation on proposed rules appropriate?

FINANCIAL SUPPORT FOR INTERSTATE COMMISSIONS AND DATA DEVELOPMENT

A third major policy issue facing interstate water commissions such as the Susquehanna and Delaware River Basin Commissions is funding. Commitment of financial resources from the parties is needed to support broad-based river basin management. Interstate

Table 1. Characteristics of River Basins where Shale Gas Extraction is occurring in the NE/NC U.S.

	Delaware River Basin	Susquehanna River Basin	Ohio River Basin (entire basin)
Size of basin	13,539 sq. miles	27,510 sq. miles	204,430 sq. miles
Estimated population served	15 million	4.2 million	27 million*
Shale under consideration for development	Marcellus	Marcellus, Utica, Upper Devonian	Marcellus, Utica, Upper Devonian in the NE and NC US
Major states involved	DE, NJ, NY,PA	MD, NY,PA	OH, PA, WV, NY in the Northeast sub-basin
Multi-state Compact	Yes Delaware River Basin Compact, 1961	Yes Susquehanna River Basin Compact, 1971	No** (However, the Ohio River Valley Water Sanitation Commission exists in parts of the basin)
Regulatory focus	Water Quantity, Quality	Water Quantity only	None

*Source: Ohio River Basin Alliance. http://www.ohioriverbasin.org/?page_id=92

**There is no formal regulatory compact, but the Ohio River Valley Water Sanitation Commission addresses wastewater pollution in a non-regulatory manner in parts of IL, IN, KY, NY, OH, PA, VA, and WV.

management requires competent technical staff and quality data. The original interstate compacts established funding formulas, which were further developed through subsequent agreements among participating states. Over time, however, the federal contribution has become negligible and some states' contributions have declined. The Susquehanna River Basin Commission, for example, has been able to apply new permit application fees to help meet the increased demand for services; in contrast, the Delaware River Basin Commission may face a shortfall due to possible funding cuts from participating states.

Additional questions include:

- Are states paying in an equitable or an otherwise appropriate manner (i.e., in relation to the amount of services that are required to address water use due to shale gas development)?
- How are agencies that have become more dependent on application fees for shale gas related water withdrawals to deal with lower revenues resulting from reduced demands for permits if or when the industry goes through downturns?

RESOURCES TO SUPPORT DATA INFRASTRUCTURE FOR SOUND DECISION-MAKING BY WATER MANAGERS

Regardless of whether an interstate commission or a state government is responsible for addressing regulatory issues, additional funding is needed to enable science-based decisions on shale related issues. Managers – whether they work in river basin commissions or state agencies – need quality data to make sound decisions. Thus, an important need is to determine the appropriate level of federal (and/or state) financial or other support to river basin commissions, and to support sound decisions by these entities. Such support may be needed for data gathering, data management, and access to users as a result of expanded shale development activities. If such a policy is not chosen, this raises questions about the implications of funding data infrastructure using alternative means (e.g. user fees), and whether such alternative systems address the ups and downs of natural resource extraction industries.

CONCLUSIONS

The development of natural gas in this part of the United States is resulting in various "natural" experiments underway with regulation and governance. This in turn raises questions about the appropriate jurisdictional scale and scope for managing water in these areas.

Because of the river basins' unique attributes and the fact that shale gas is a relatively new activity, no broader conclusions are yet possible. However, a few observations include:

- Shale gas wells are not being drilled in the Delaware River Basin, where a commission has stronger regulatory authorities over water quality and water quantity.
- The Susquehanna River Basin Commission has been successful in implementing water quantity focused rules. These rules have been extended by the Pennsylvania Department of Environmental Protection to the Ohio River Basin where there is not a similar inter-basin commission. Some Pennsylvania and West Virginia residents have asked about how river basin commissions may bring benefits through improved management of Ohio River Basin waters. The development of shale-related natural gas may lead to proposals for a river basin compact or similar institution to manage water more systematically within the Ohio River Basin.

As these issues develop, additional policy concerns will arise and more study will be needed. In the meantime, this is a rapidly evolving area of policy, with major implications not only for this region, but also for elsewhere in the United States and in the world.

FOR MORE INFORMATION

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