Water-quality trading can reduce river pollution

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Allowing polluters to buy, sell or trade water-quality credits could significantly reduce pollution in river basins and estuaries faster and at lower cost than requiring the facilities to meet compliance costs on their own, a new Duke University-led study finds.

The scale and type of the trading programs, though critical, may matter less than just getting them started.

"Our analysis shows that water-quality trading of any kind can significantly lower the costs of achieving Clean Water Act goals," said Martin W. Doyle, professor of river science and policy at Duke's Nicholas School of the Environment.

"All other things being equal, regulators should allow trading to occur at the river basin scale as an appropriate first step. Larger spatial scales may be needed later if abatement costs increase," said Doyle, who also serves as director of the water policy program at Duke's Nicholas Institute for Environmental Policy Solutions.

The new study was published this month in the journal *Water Resources Research*. It comes at a time when regulators are debating the optimal scales and types of trading programs to reduce water pollution in some of the nation's largest and most troubled watershed systems, including the Chesapeake Bay watershed, which spans 64,000 square miles in parts of six states.

In water-quality trading programs, facilities facing higher pollution control costs are allowed to meet their regulatory obligations by purchasing pollution reduction credits from other polluters in their trading market. The end result—improved water quality—is the same, but the time and money needed to achieve it is less.

New programs are often delayed because regulators want to get as many things right up front as they can. Concerns include how big or small a trading market should be, whether it should include interstate trading, and whether it should be based on one-for-one trades or trading ratios.

Getting these details right is vital, Doyle said, but it's also important not to let them bog down a program's launch.

"Our research very clearly shows that while achieving an optimal scale is best, any approach will yield gains over no trading at all," he said. "So the point is to allow trading."

To conduct their analysis, Doyle and his team developed a coupled hydrologic-economic model that measured the impacts of one-for-one trading and trading ratios among wastewater treatment plants in river basins draining into North Carolina's Albemarle-Pamlico Sound, the nation's second largest estuary. They assessed the pros and cons of each program type over the entire length of the basins, not just downriver or in the estuary. They also looked at how costs were affected when market scale was expanded from sub-basin to basin-wide, and then to a larger area that included adjacent basins extending into Virginia.

"As the markets got larger, facilities had more opportunities to find suitably sized trading partners who could help them reduce compliance costs," Doyle said. "But as we exceeded the basin scale, we reached a tipping point where risks increased so that pollution from many sources could end up in just a few places, creating pollution hotspots."

The study found only modest differences in the effectiveness of programs allowing one-for-one trading versus trading ratios. The optimal scales of markets remained the same under either scenario.

In addition to demonstrating that basin-wide trading is the optimal initial scale for many markets, the team's findings reinforce the need for interstate trading, Doyle said.

"Look at a map of the United States. If we are going to have water-quality trading here, we are going to have to allow interstate trading because of the geography of our states and river basins," he said. "Pollution doesn't start or stop at state borders."

Doyle is planning future studies to see if the same approach works for reducing non-point-source pollution from urban and agricultural runoff, which is a bigger problem in many river basins.

More information: "Optimizing the Scale of Markets for Water Quality Trading," Martin W. Doyle, Lauren Patterson, Yanyou Chen, Kurt Schnier, Andrew J. Yates. *Water Resources Research*, Sept. 11, 2014. DOI: 10.1002/2014WHR015395

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