New Insights:

Science-based evidence of water quality improvements, challenges, and opportunities in the Chesapeake

Executive Summary

A tool for watershed management

New Insights summarizes the changes in water quality resulting from nutrient reducing practices in more than 40 Chesapeake Bay watershed case studies. In many examples, water quality monitoring data reveal the benefits of restoration practices aimed at reducing nutrient and sediment pollution flowing into our local waters.

The science-based evidence summarized here shows that:

- *Several groups of pollution-reducing practices, also known as best management practices or BMPS, are effective at improving water quality and habitats;*
- *Specific challenges can still impede water quality improvements; and*
- *More practices that focus on the impacts of intensified agriculture and urban and suburban development are needed for healthier waters.*

New Insights: Case study locations

Our long-term efforts to reduce pollution have led to local improvements in our air, land, and water.

Monitoring efforts show that three kinds of BMPs can effectively improve water quality:

Improvements to wastewater treatment plants.

Technological upgrades to wastewater treatment plants across the Chesapeake Bay watershed have decreased the amount of excess nutrients flowing into local waters. In some areas, the resulting improvements in water quality have also led to a resurgence in underwater grasses.

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Reductions in amounts of nitrogen coming from the atmosphere.

Efforts to reduce nitrogen entering the atmosphere from vehicle emissions and power plant emissions have resulted in less airborne nitrogen reaching our rivers and the Chesapeake Bay. In some locations, these reductions have contributed to improved surface water quality.

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Reductions in nutrients from various forms of agricultural land runoff.

Research shows that planting cover crops, managing fertilizer and manure applications, and limiting livestock access to streams can reduce nutrients, and in some instances sediment, in rivers and streams as well as in groundwater (water that seeps into the earth and ultimately drains to local waterways).

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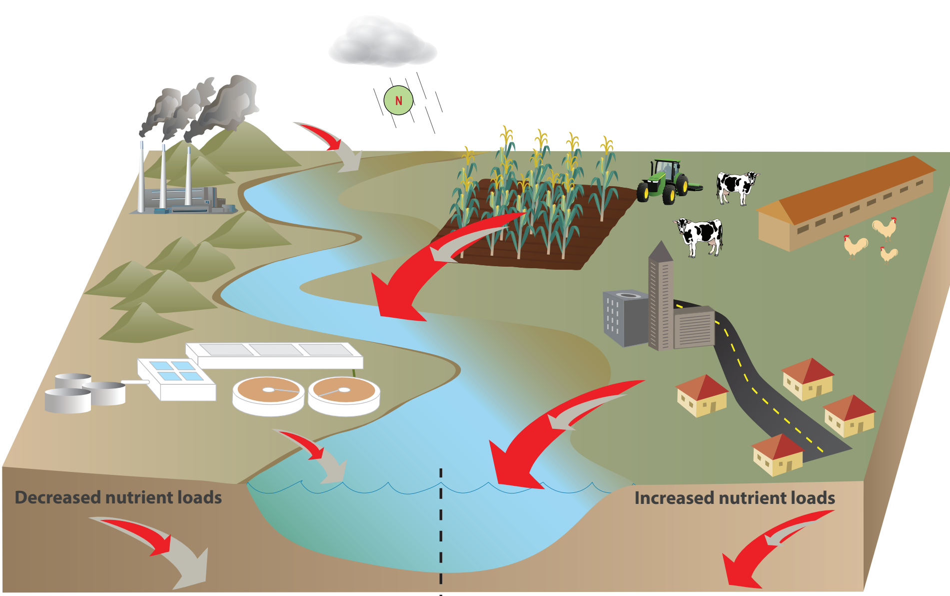
Our progress is affected by 'lag times' and can be overwhelmed by unsustainable transformations to the landscape.

Once a restoration practice is put in place, it can take time to see visible improvements in water quality. These delays, called 'lag times,' can vary based on the kind of restoration work completed, the geology of the restoration site, its distance from a nearby river or stream, and many other factors. One of the major factors is the slow movement of groundwater and the nutrients it often carries. This means the full benefits of our pollution-reducing work can take decades or more to be seen. Patience and persistence are needed to realize the results of restoration efforts.

As we convert our landscapes from forests and wetlands to urban and suburban neighborhoods and intensive agricultural operations, local and regional water quality declines. A better understanding of these growing challenges is essential, as it will lead directly to opportunities for better management of pollution sources.



Best management practices (BMPs) such as wastewater treatment plant upgrades and reduced power plant No$_x$ emissions are proven practices that reduce nutrient loads to the Chesapeake Bay watershed.

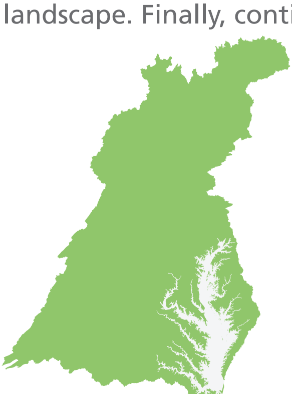
Increases in other pressures, such as intensified agriculture and greater stormwater runoff from expanding development can increase nutrient loads, counteracting water quality improvements that would have resulted from effective BMP implementation.

We need to be diligent about how and where we use both proven and innovative practices to reduce pollution, and in monitoring how well they work.

By monitoring water quality when restoration practices are put in place, scientists have provided evidence of successful practices that can result in healthier waters and improved habitats. They have also helped us better understand the challenges we all face. In particular, evidence shows that improving stormwater management in the face of the watershed's growing cities, towns and communities is vital for the long-term health of our waterways.

Jane Thomas, IAN Image Library

Experts and decision-makers need to utilize this science-based evidence to better identify locations of specific nutrient pollution sources in the Chesapeake Bay region. Then managers must ask the right questions as they consider implementation: What is the best practice to reduce the impacts from these nutrient sources? Where should that practice be used? Choosing the best proven or innovative practice can result in more effective local action and achieve better results in any given landscape. Finally, continued long-term, water quality monitoring plays an important role in informing everyone—scientists, decision-makers and managers— when adjustments to restoration work are needed.



For more information and to access the full New Insights report online, visit

ian.umces.edu/link/newinsights

Adjusting our course

The examination of water quality monitoring data associated with best management practice implementation in the Chesapeake Bay watershed reveals multiple implications for continued efforts in Bay restoration:

1 *Investments in sewage treatment plants provide rapid water quality improvements.*

2 *National requirements of the Clean Air Act are benefitting the Chesapeake Bay watershed.*

3 *Some agricultural practices are providing local benefits to streams.*

4 *Lag times that delay improvements mean patience and persistence are needed to realize the results of our efforts.*

5 *Expanding population, increased fertilizer use, and more livestock may counteract water quality improvements.*

6 *Science should be better used to guide restoration choices and subsequent monitoring is needed to evaluate effectiveness.*

7 *Proven and innovative stormwater management practices need to be implemented and evaluated to maintain and improve Bay health as urban and suburban development expands.*

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