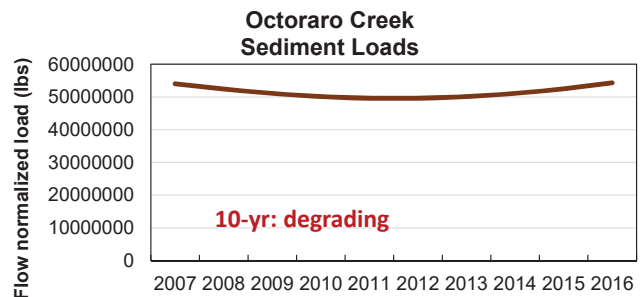
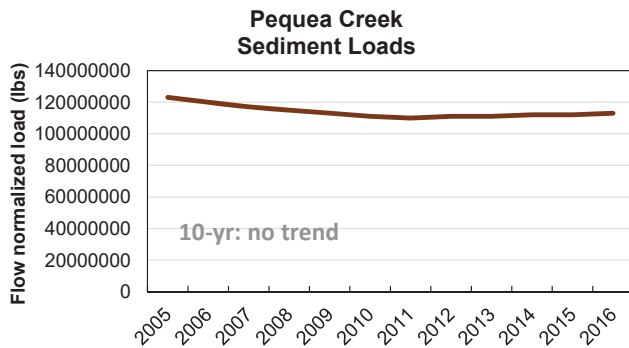
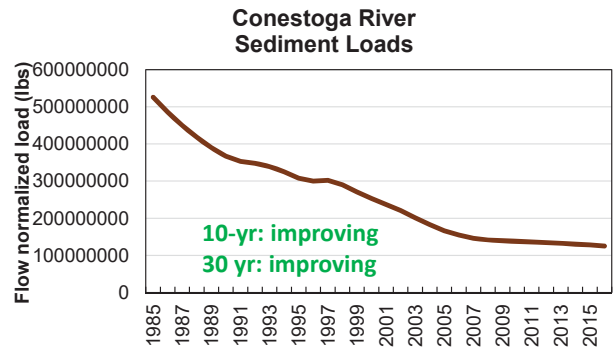
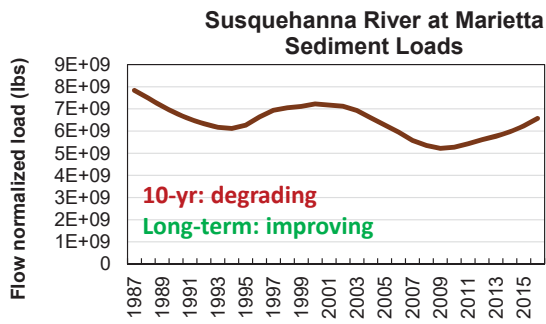
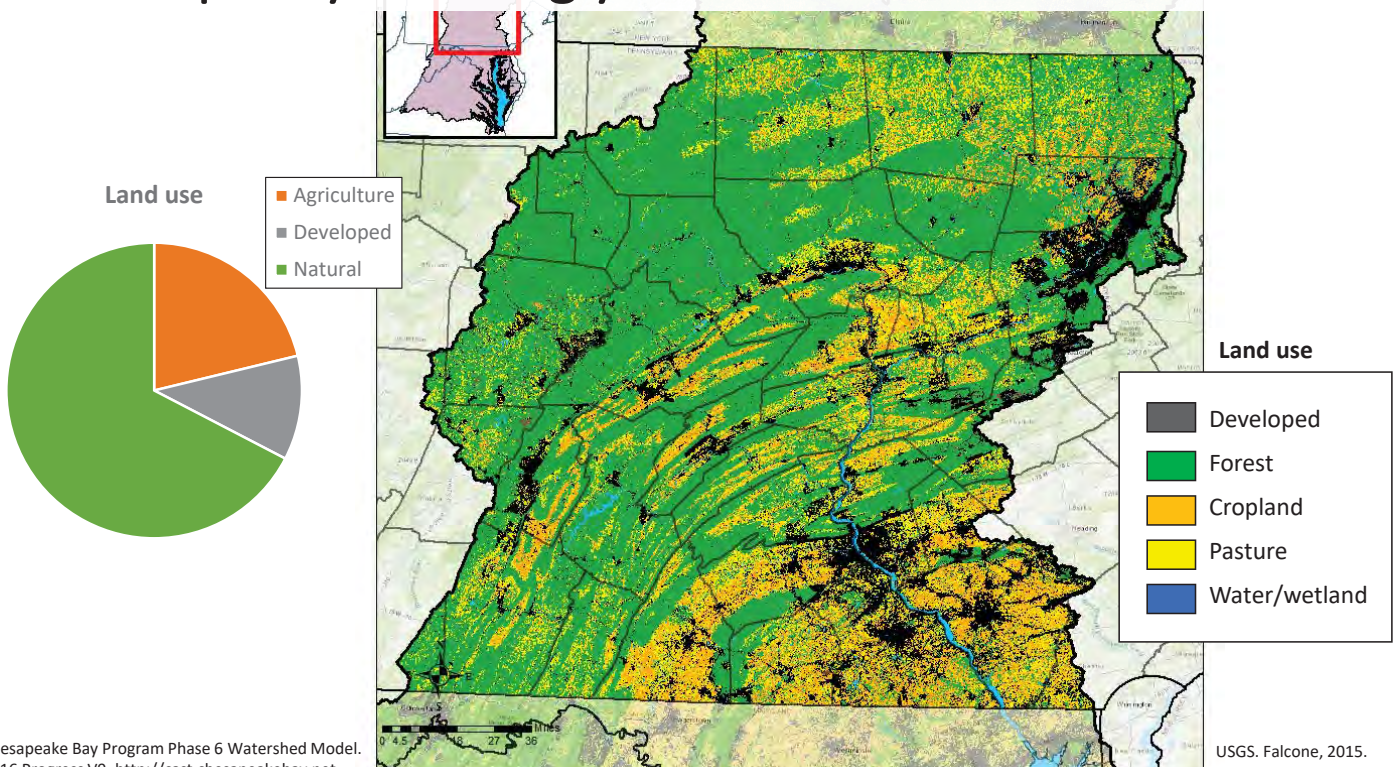


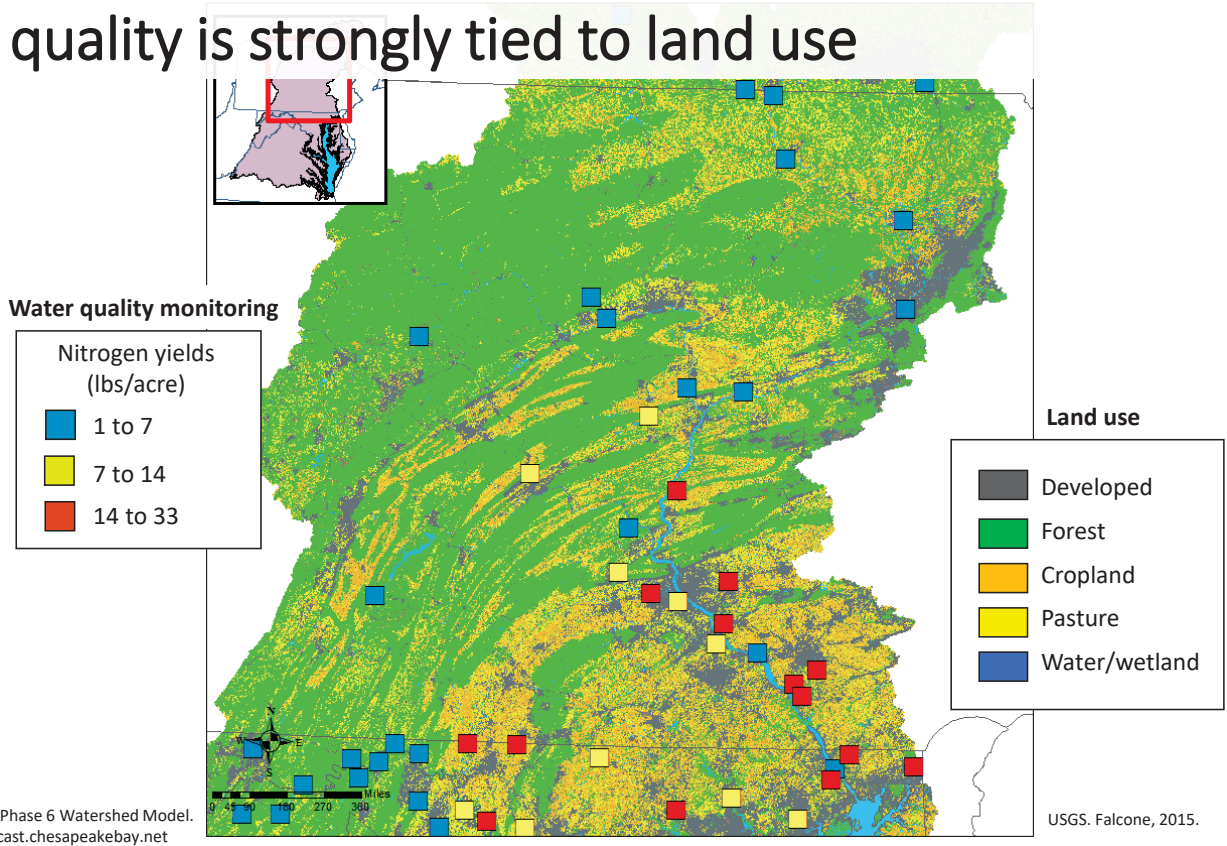
Example: Water quality in Lancaster County watersheds: sediment



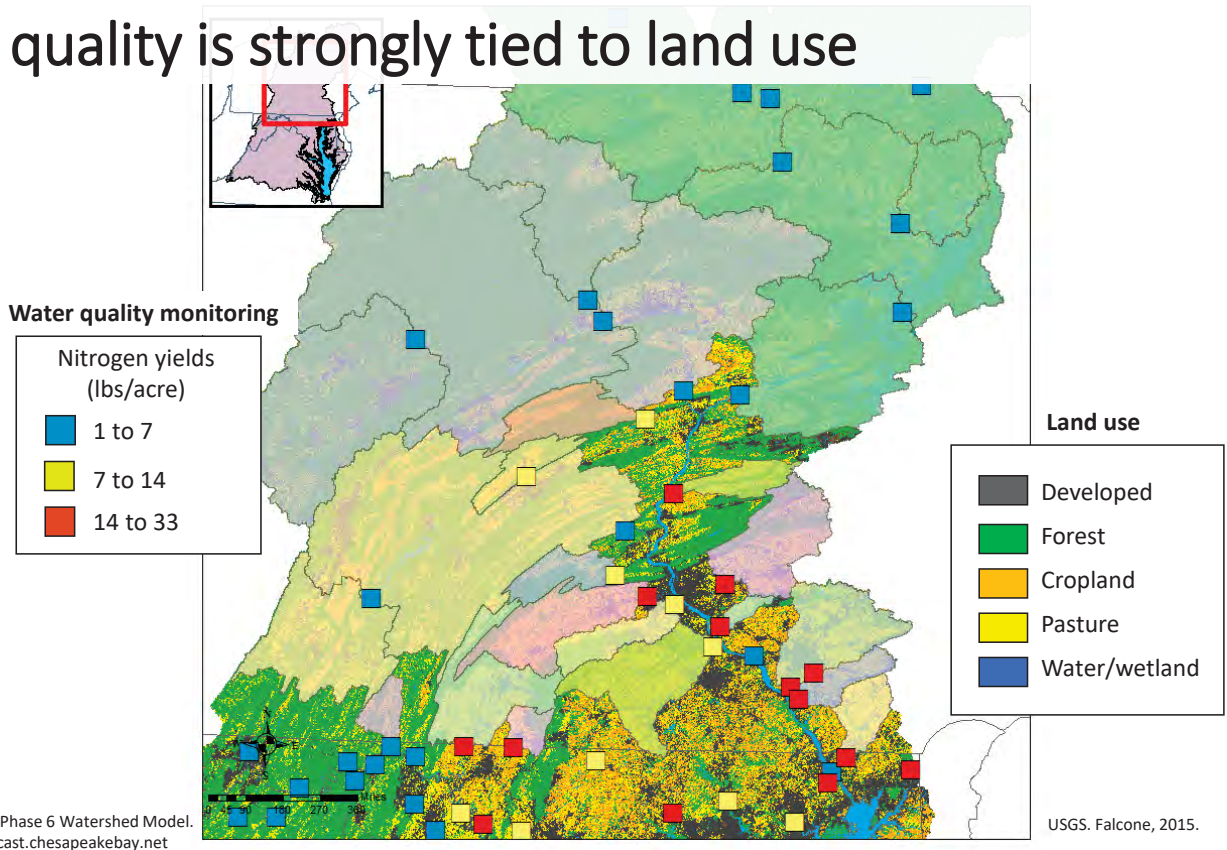
Water quality is strongly tied to land use



Water quality is strongly tied to land use



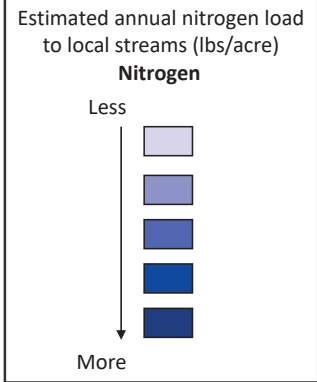
Water quality is strongly tied to land use



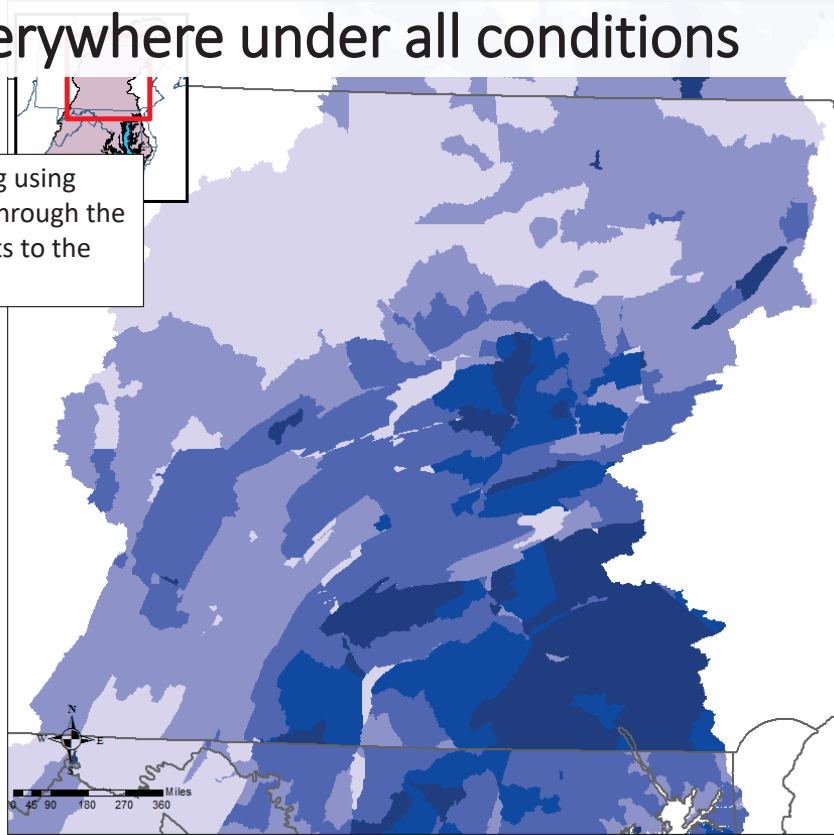
We can't monitor everywhere under all conditions

Models are built off water quality monitoring using research that explains how nutrients move through the watershed, and incorporating reported inputs to the watershed

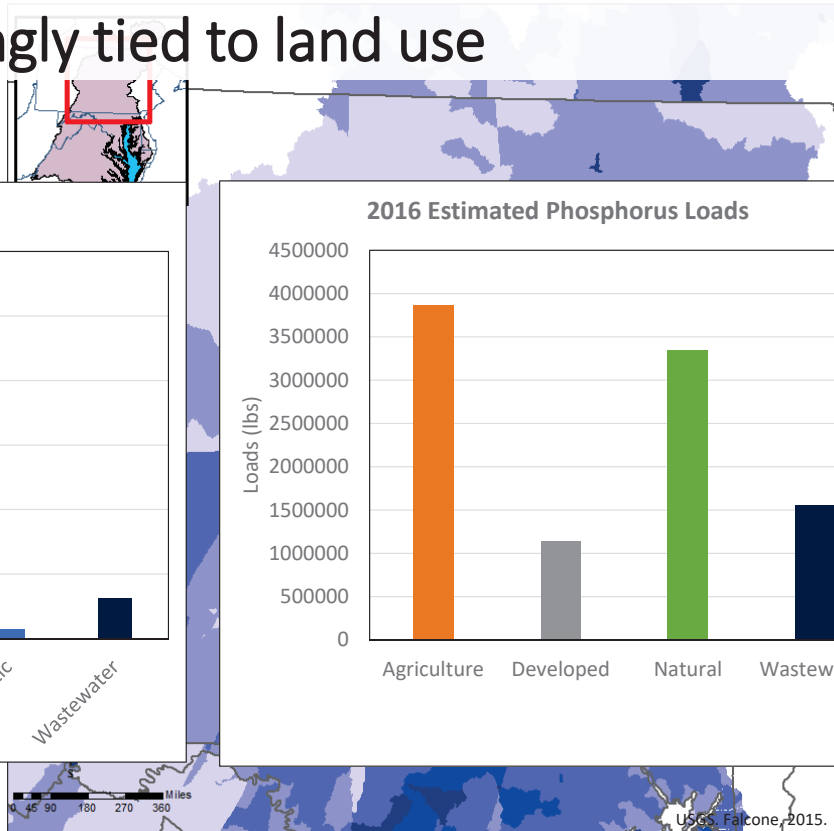
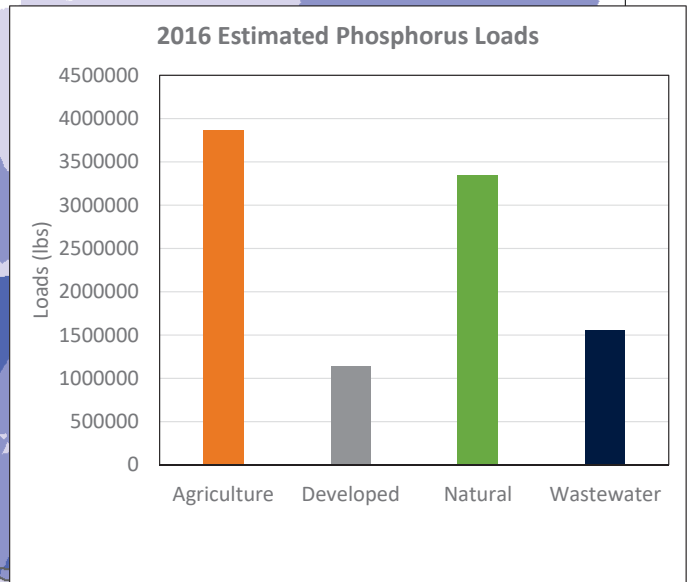
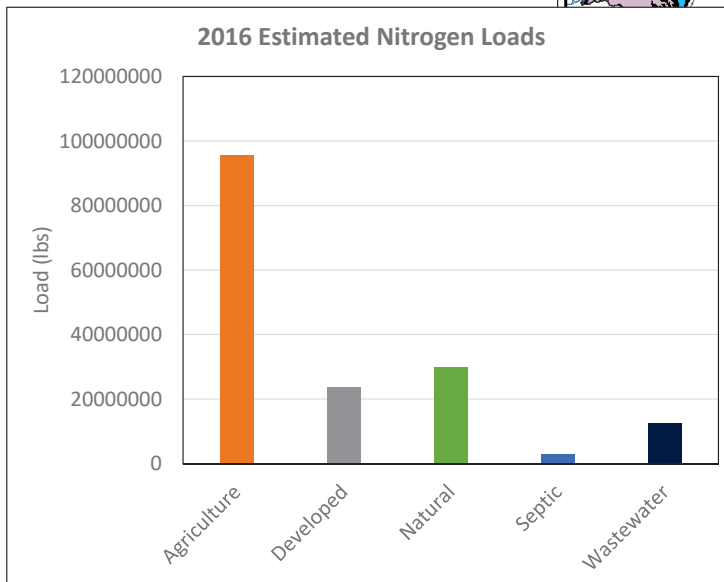
Bay Program Watershed Model



Chesapeake Bay Program Phase 6 Watershed Model. 2016 Progress V9. <http://cast.chesapeakebay.net>



Water quality is strongly tied to land use



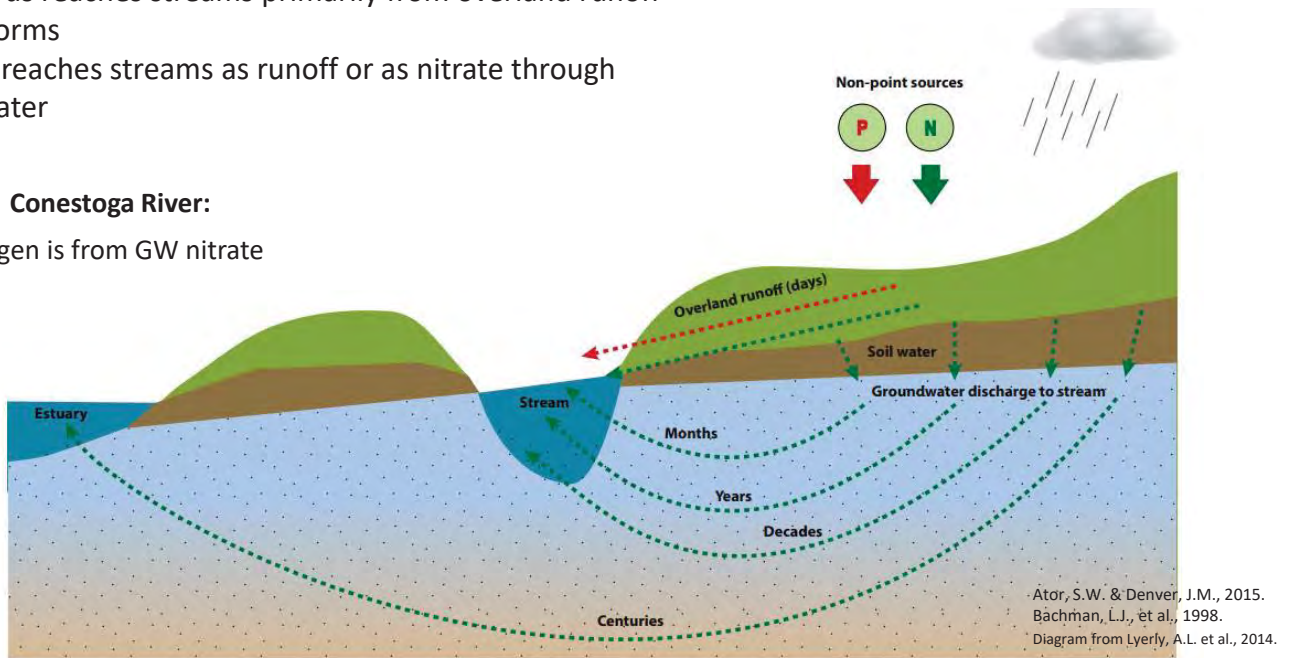
Chesapeake Bay Program Phase 6 Watershed Model. 2016 Progress V9. <http://cast.chesapeakebay.net>

USGS, Falcone, 2015.

The transport of nutrients matters for planning implementation

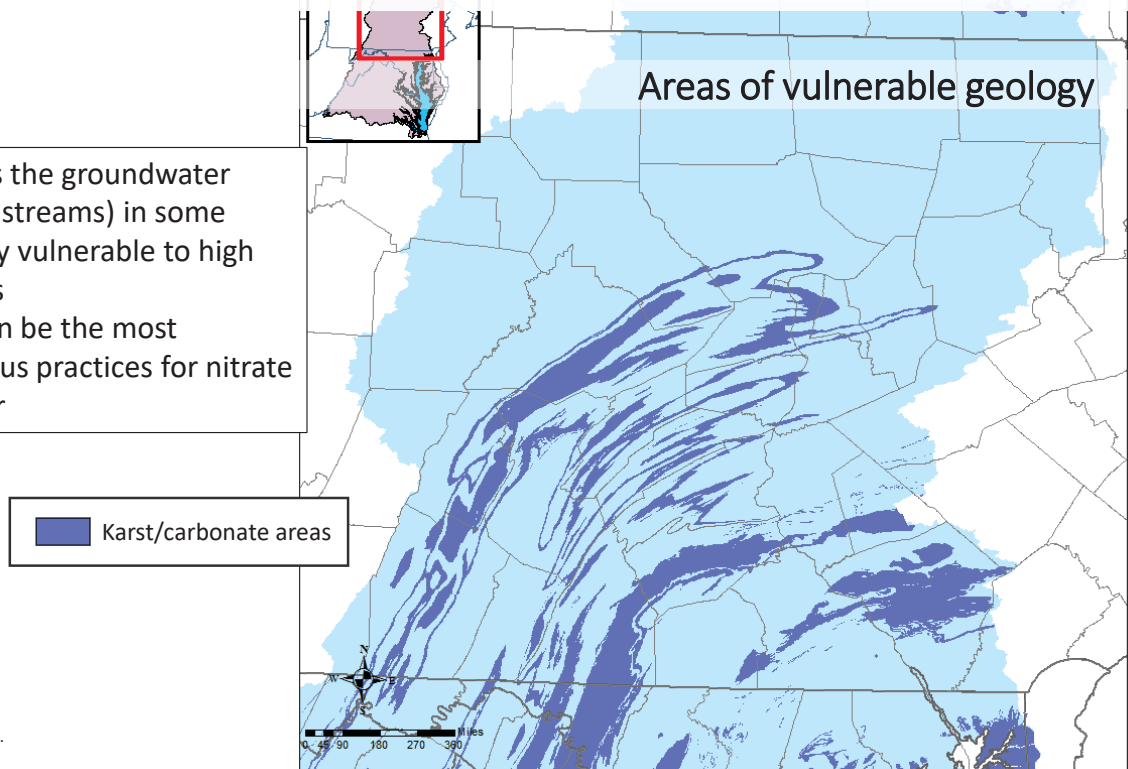
- Phosphorus reaches streams primarily from overland runoff during storms
- Nitrogen reaches streams as runoff or as nitrate through groundwater

Conestoga River:
64% of nitrogen is from GW nitrate



Certain areas of the watershed are more vulnerable

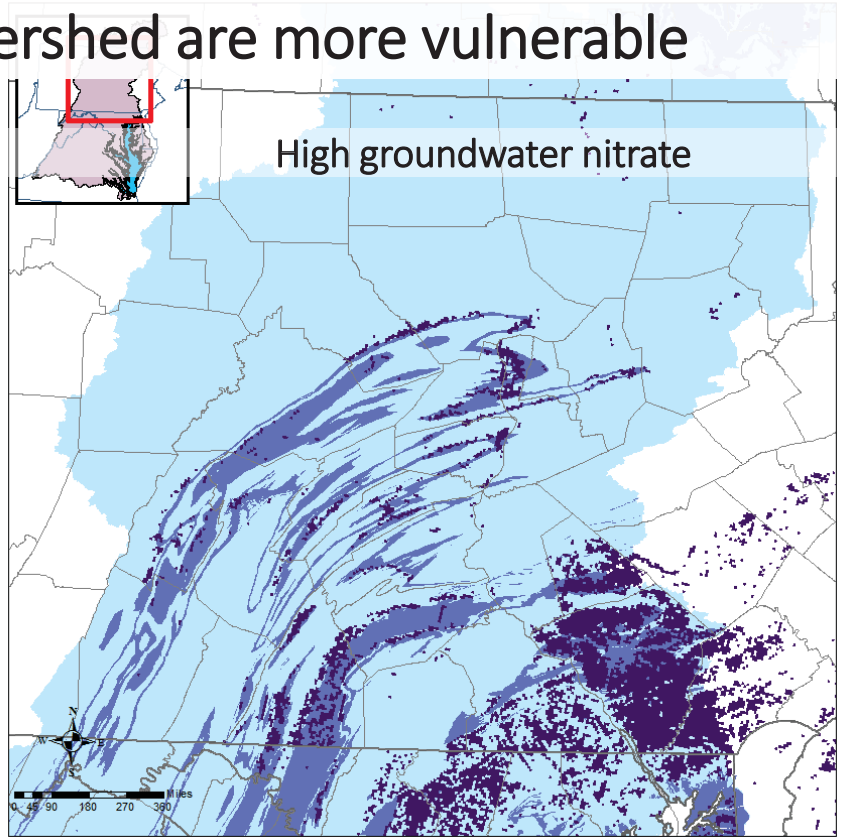
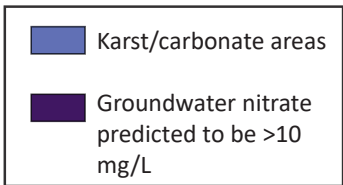
- Geology makes the groundwater (and therefore streams) in some areas especially vulnerable to high nitrogen inputs
- These areas can be the most effective to focus practices for nitrate in groundwater



Modified from Jimmy Webber, USGS, using Brakebill, JW 2000, Ator, S. et al. 2005 and Nolan & Hitt, 2006.

Certain areas of the watershed are more vulnerable

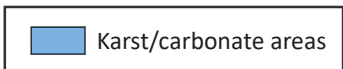
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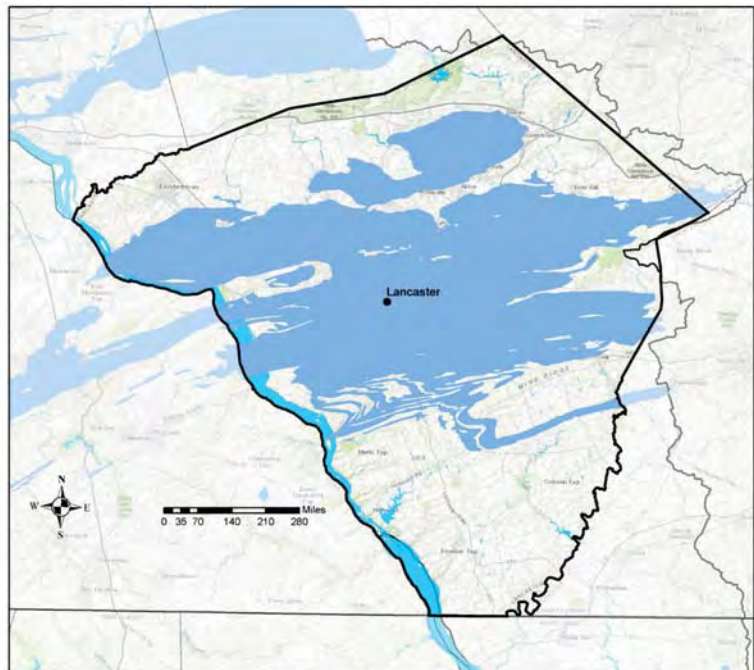
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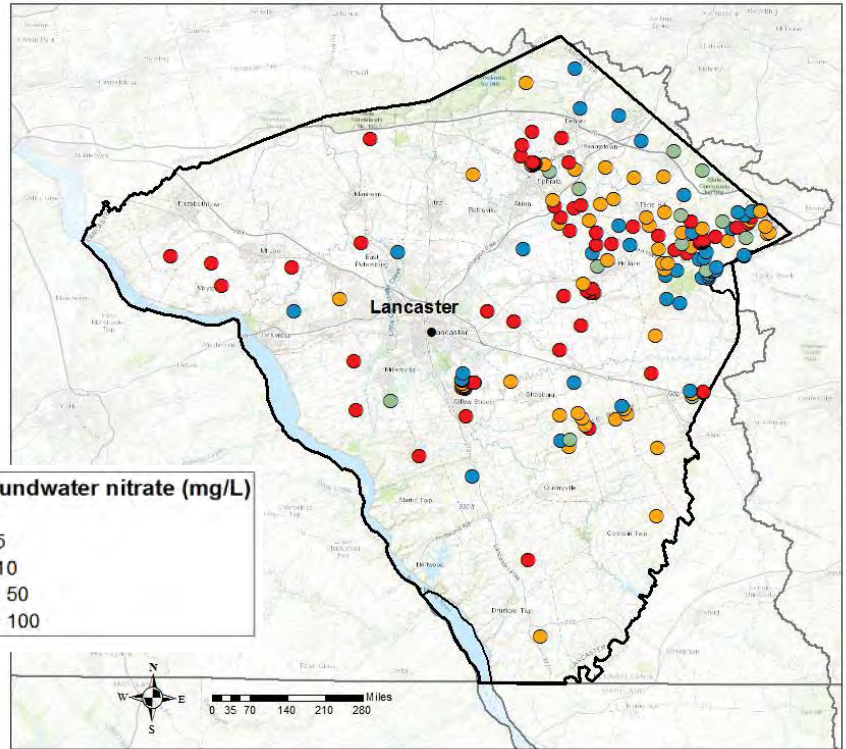
Areas of vulnerable geology



Modified from Jimmy Webber, USGS, using Brakebill, JW 2000, Ator, S. et al. 2005 and Nolan & Hitt, 2006.

Certain areas of the watershed are more vulnerable

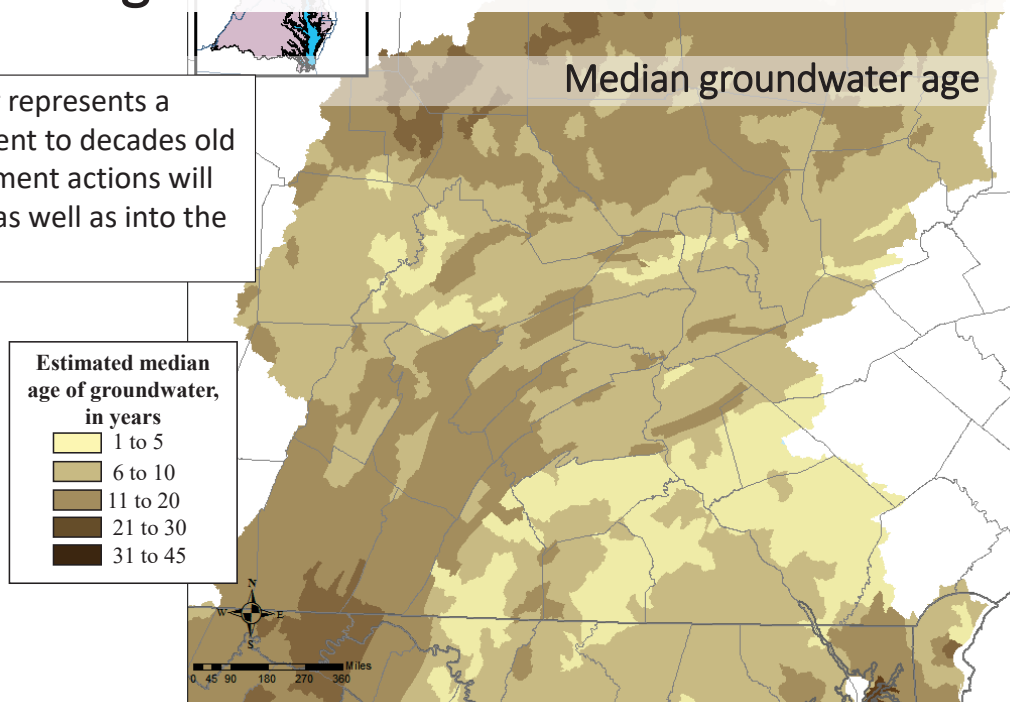
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- These areas can be the most effective to focus practices for nitrate in groundwater



Modified from Jimmy Webber, USGS, using Brakebill, JW 2000, Ator, S. et al. 2005 and Nolan & Hitt, 2006.

Groundwater takes varying amounts of time to reach streams depending on location

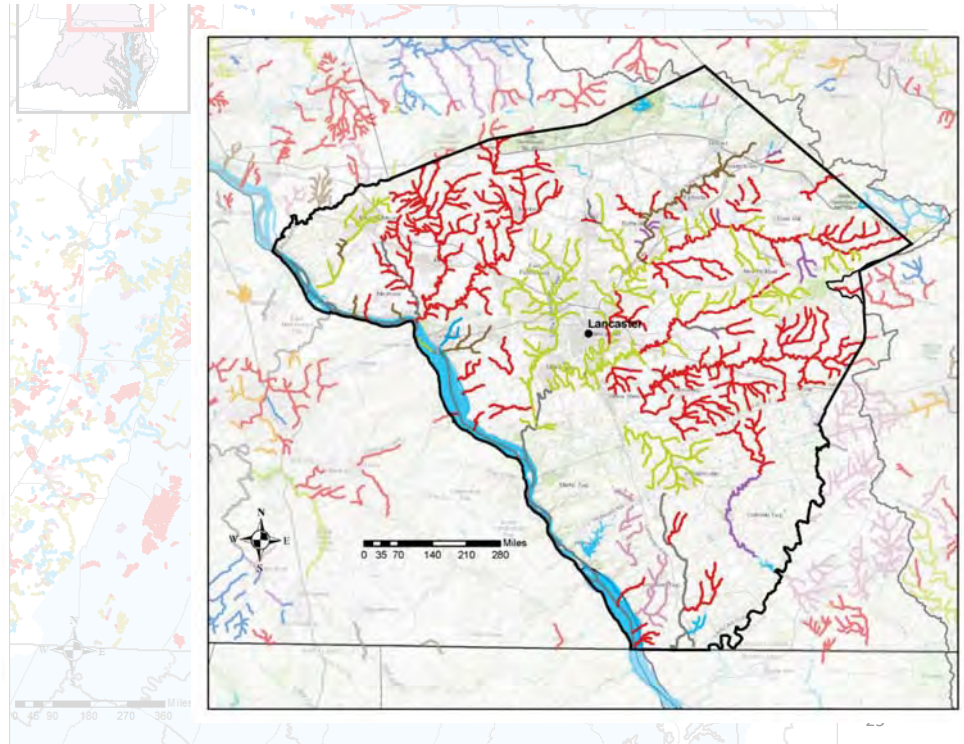
- Nitrate in groundwater represents a range of ages from recent to decades old
- Benefits from management actions will manifest immediately as well as into the future



Phase 6 WSM groundwater age estimates. DRAFT from Jimmy Webber, USGS and Ghopal Batt, Chesapeake Bay Program.

Local restoration efforts help Pennsylvania's waters

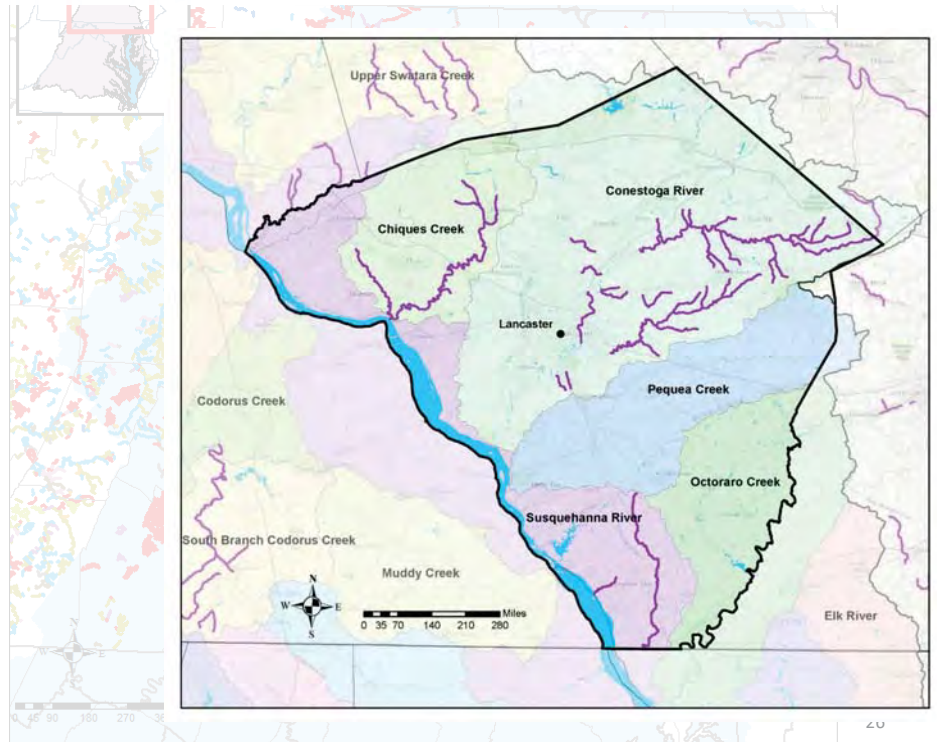
Pennsylvania's impaired streams



PADEP

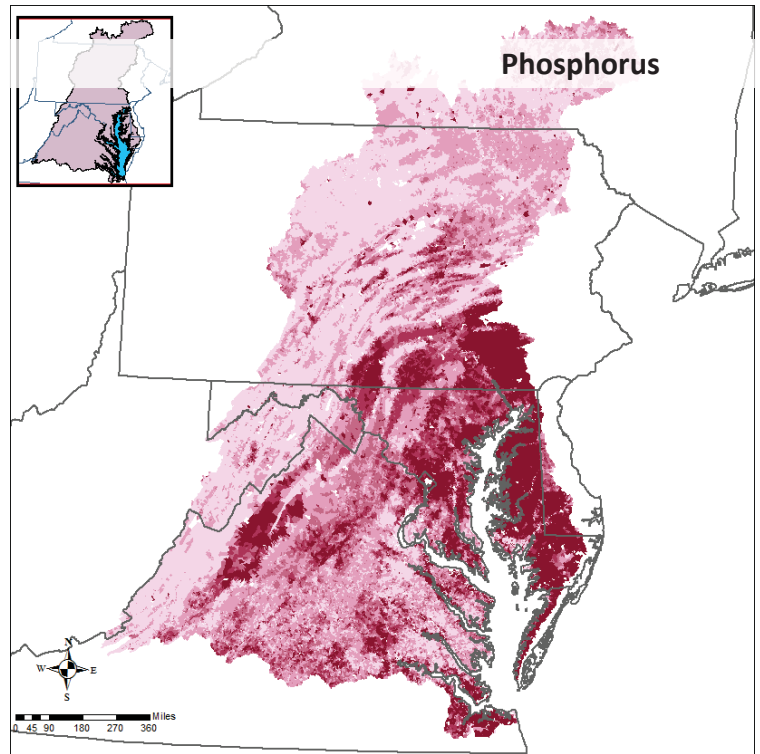
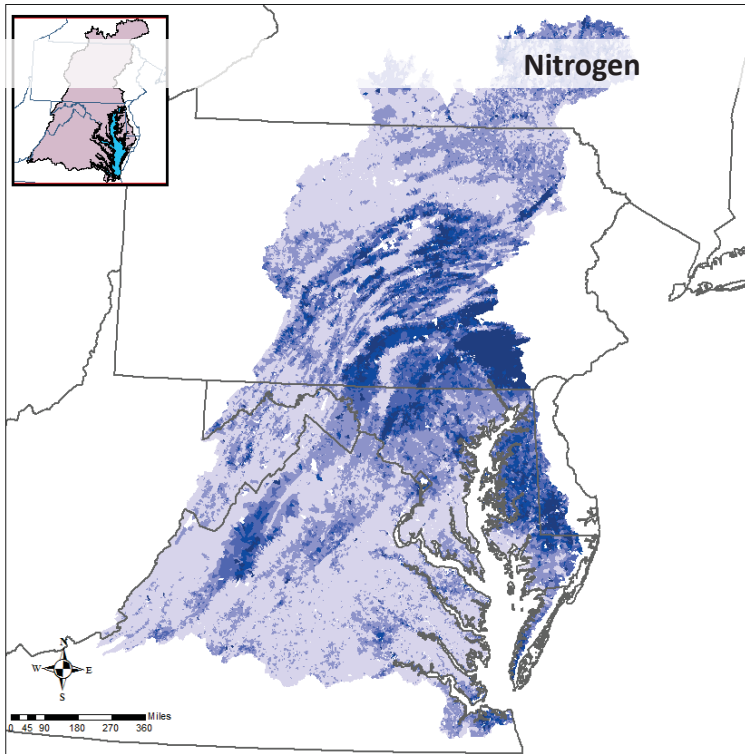
Local restoration efforts help Pennsylvania's waters

Pennsylvania's impaired streams

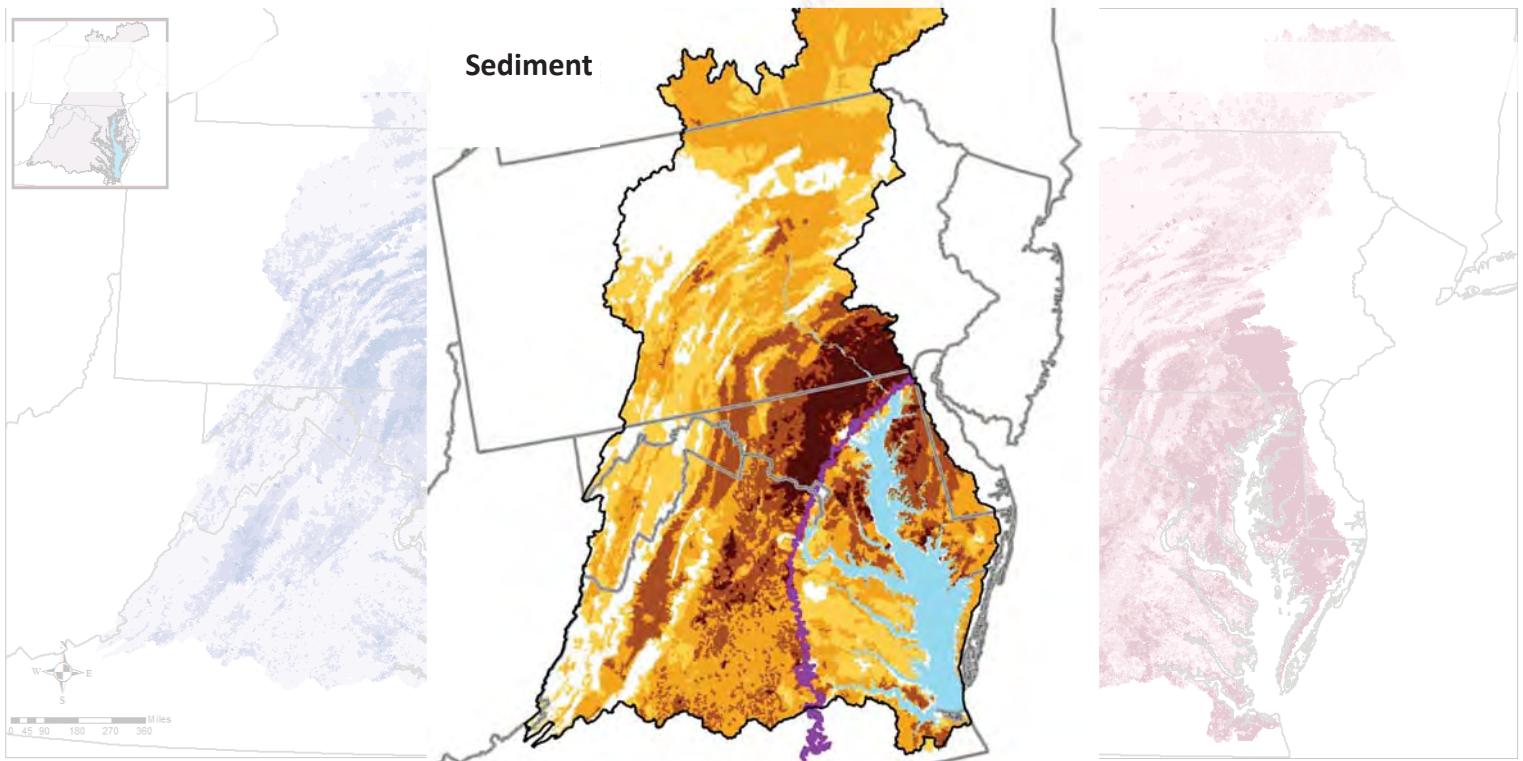


PADEP

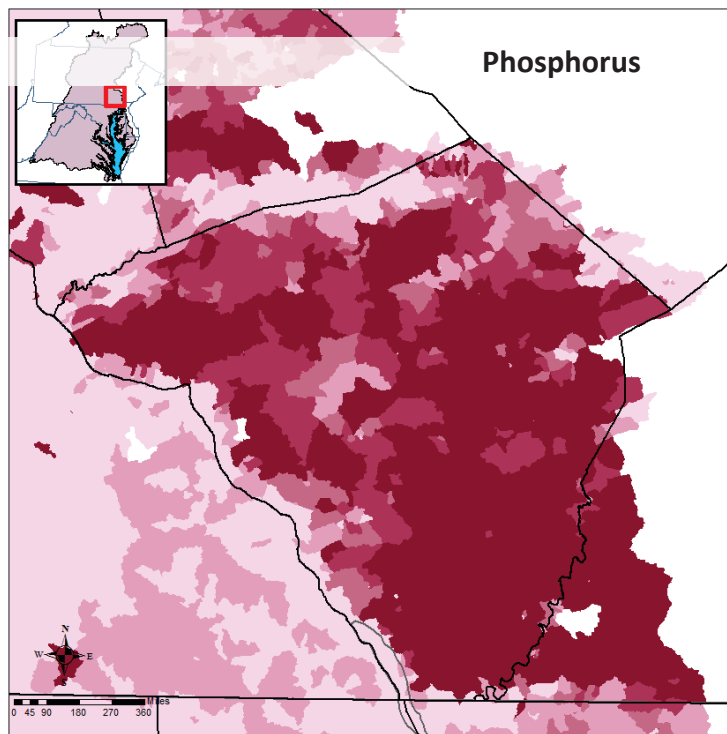
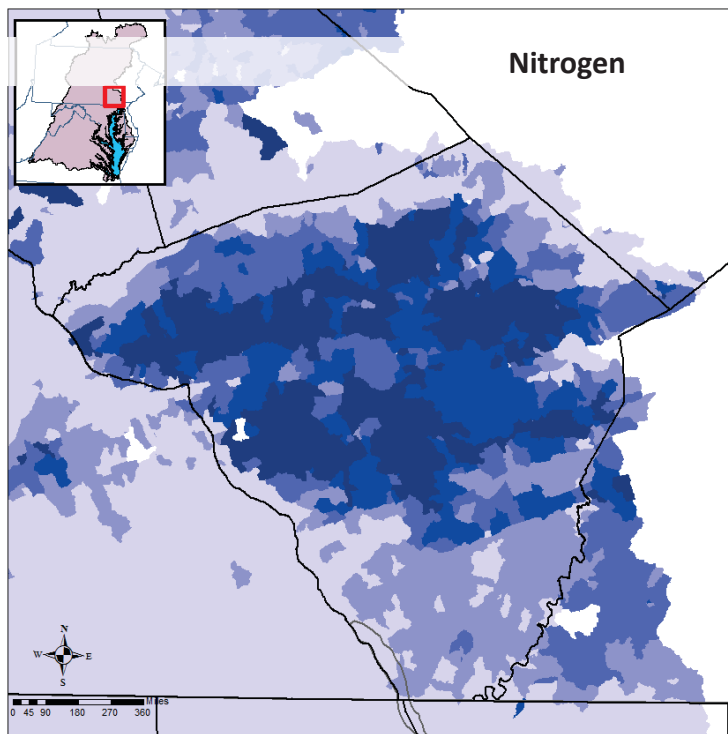
Focusing efforts where they can make the most difference



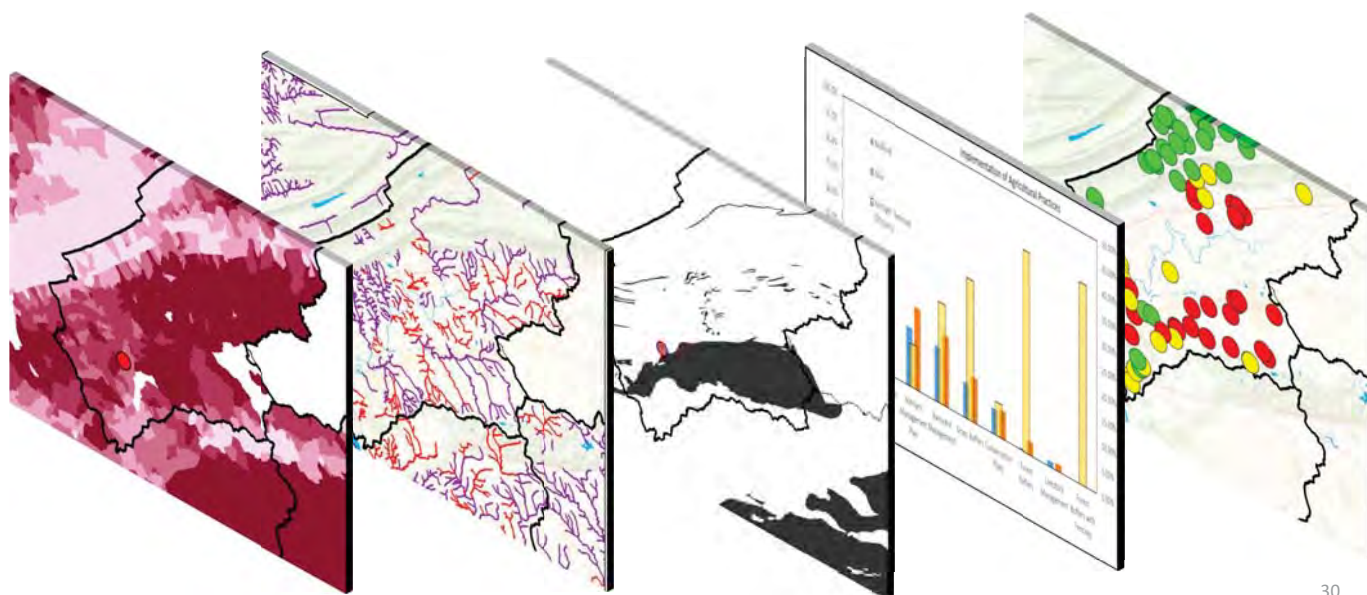
Focusing efforts where they can make the most difference



Focusing efforts where they can make the most difference



This information can be integrated at different levels to help inform efforts...



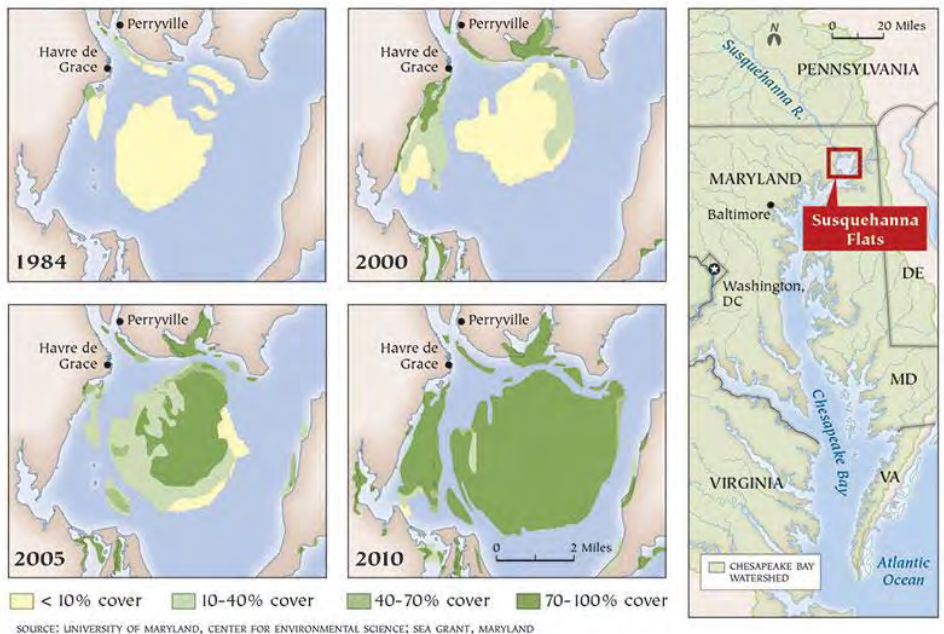
Chesapeake Bay Program Office Technical Resources to Aid in Local Planning

Matthew Johnston
Senior Policy Analyst
University of Maryland – Chesapeake Bay Program

All data presented are for hypothetical planning purposes only, and should be considered draft until final approval of the Phase 6 Model occurs later in 2018.

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Thank you Pennsylvania!



- Picture at left presented to PACD in 2016.
- Baltimore Sun, March 5, 2018:

“Researchers say Chesapeake Bay cleanup initiatives have triggered a major resurgence of the underwater grasses that are at the center of the estuary's fragile food web.”

“Scientists from across Maryland and Virginia say that from 1984 to 2014, concentrations of nitrogen in the bay fell by 23 percent while the acreage of areas covered with submerged vegetation more than tripled, to nearly 100 square miles.”

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