

Constructing Artificial Wetlands in the Patuxent River Watershed



Northern Shoveler Team

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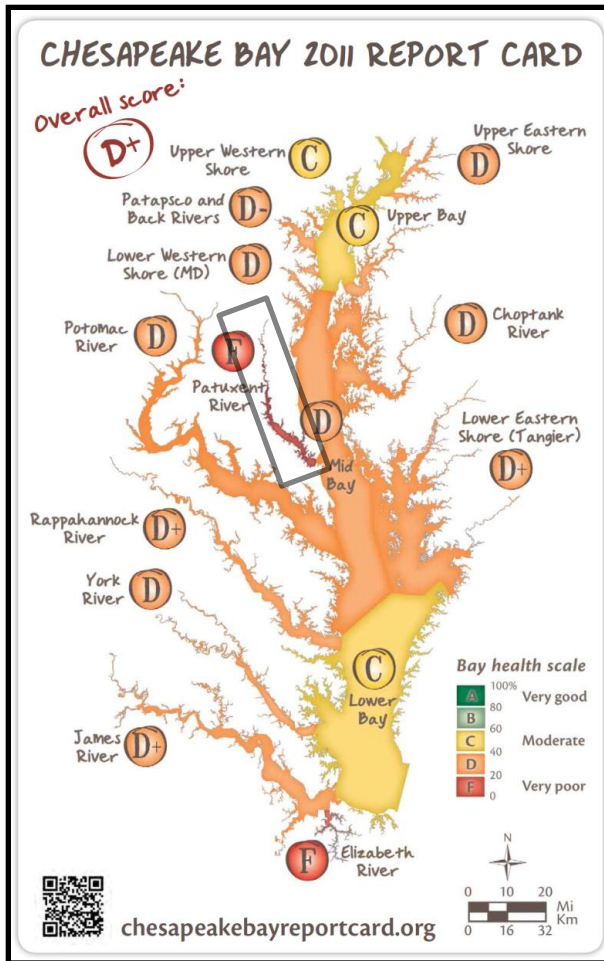
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Project outline

- ❖ Introduce problem – Chesapeake Bay Water Quality
- ❖ Benefits of wetlands
- ❖ Justification for wetlands
- ❖ Identifying key locations for wetlands

Patuxent River fails at bay health



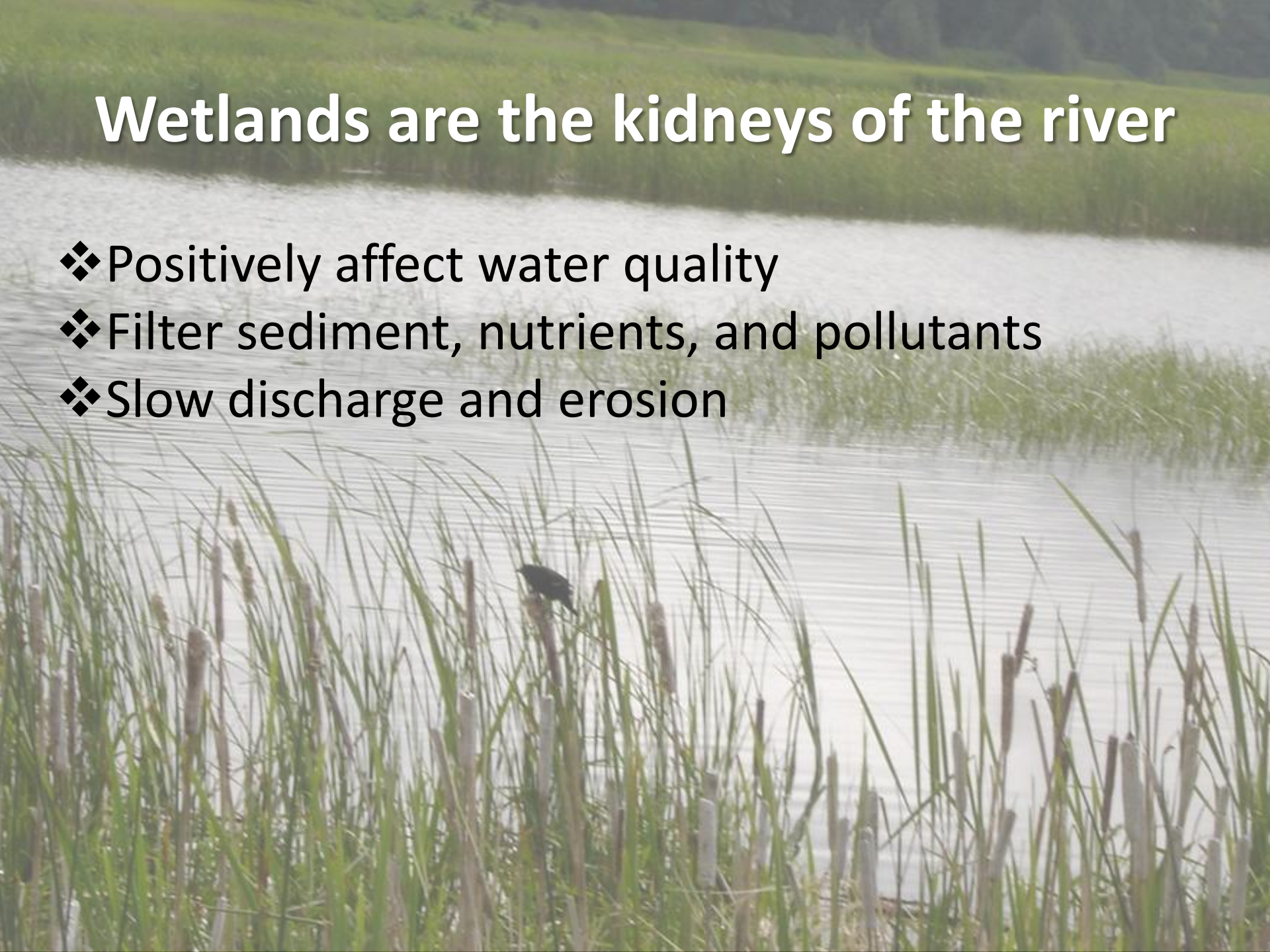
- ❖ 2011 IAN Report Card
- ❖ Chesapeake Bay Water Quality poor
- ❖ Overall score down from 2010
- ❖ Patuxent River grade: **F**

The Patuxent River is near Baltimore and Washington DC



Wetlands are the kidneys of the river

- ❖ Positively affect water quality
- ❖ Filter sediment, nutrients, and pollutants
- ❖ Slow discharge and erosion



Biodiversity depends upon wetlands

- ❖ Ecosystem services
- ❖ Habitat loss
- ❖ 50% of wetlands have disappeared
- ❖ 80% of aquatic vegetation has disappeared



Clean water and wetlands enhance food web health

- ❖ 2,700 animals and plants
- ❖ Interdependency
- ❖ Direct and indirect effects
- ❖ Cascade effect



Legislation places value on wetlands

- ❖ 1989 – National Policy
“No-net loss of wetlands”
- ❖ State of Maryland requires wetland mitigation for many agricultural and development activities
- ❖ Patuxent River 20/20 Report values wetlands for “habitat and water quality protection”



Wetland creation costs are variable

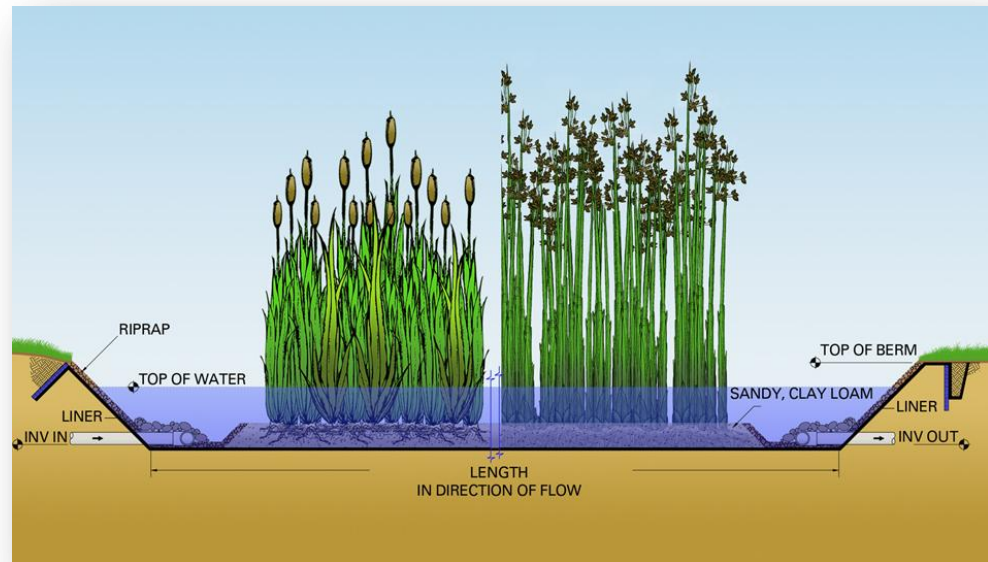
❖ Wetland mitigation credits

- \$3,000 - \$600,000 per acre

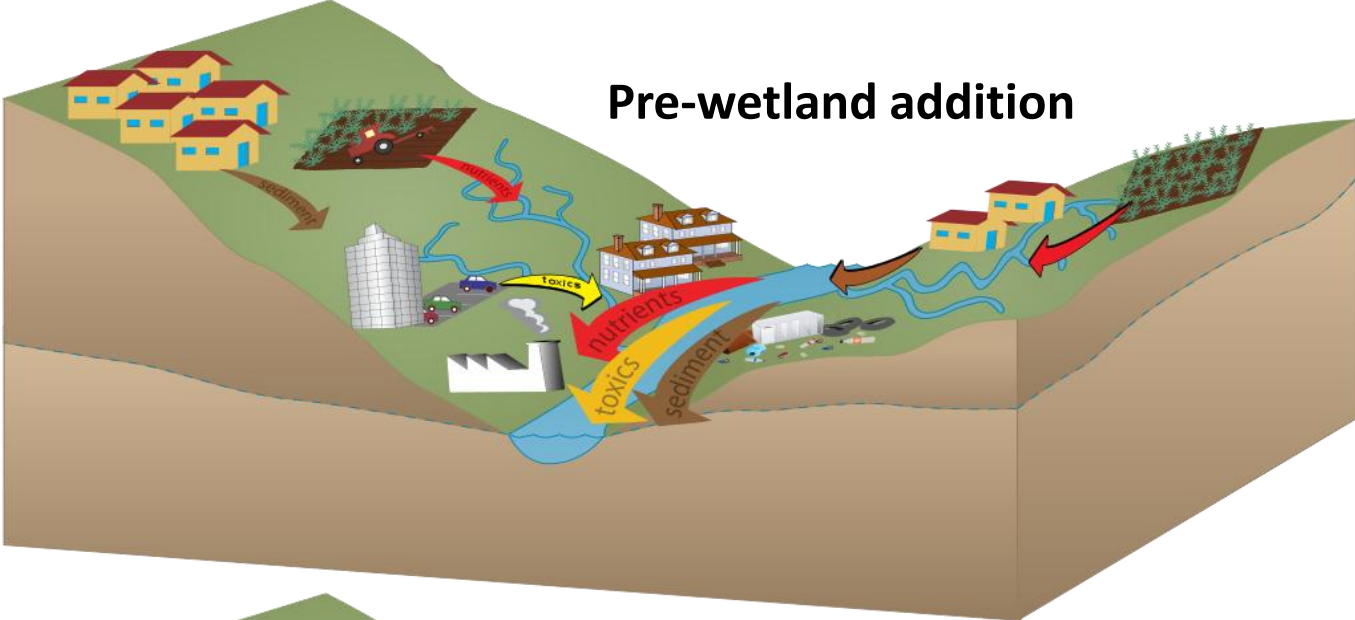
❖ Maryland mitigation

- ~\$10,000/ac - hydric soils
- ~\$50,000/ac - upland sites

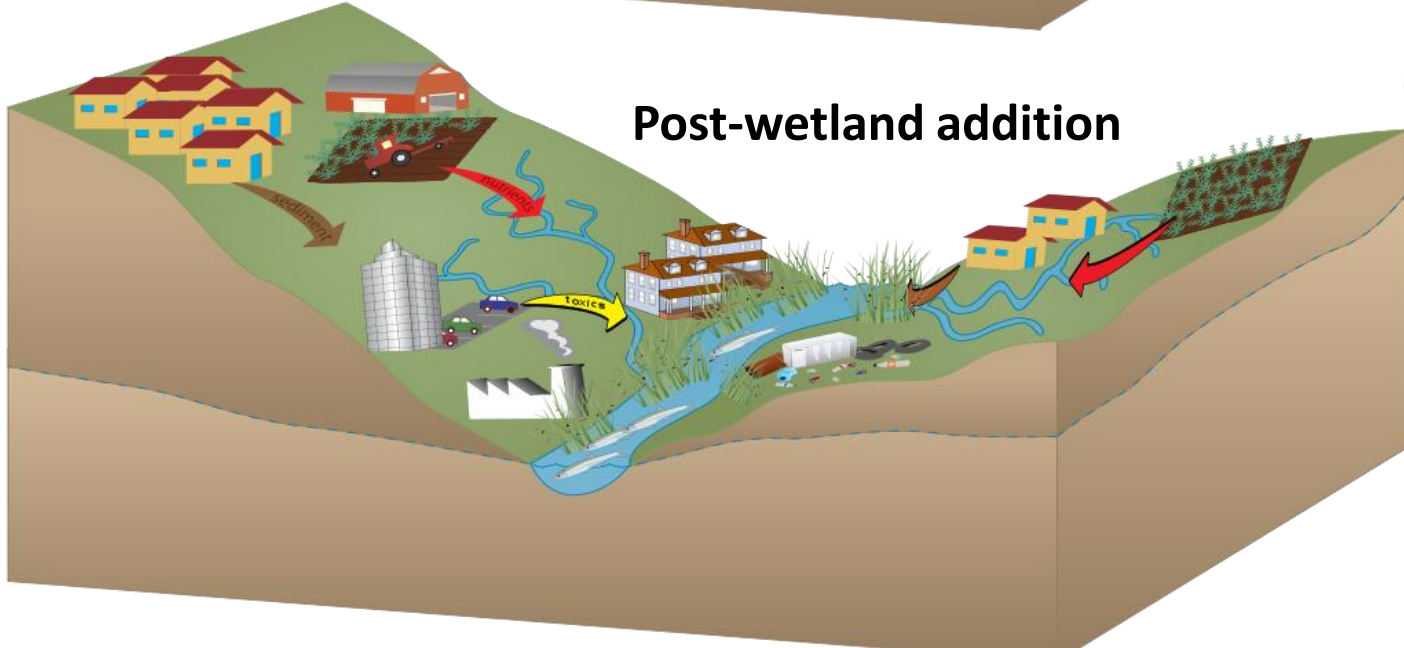
❖ Cost of purchasing land varies



Where would artificial wetlands have the greatest positive impacts on water quality?



- Urban development
- Agriculture
- Industry
- Impervious surfaces
- Artificial wetlands
- Trash



- Sediments
- Nutrients
- Toxics

Evaluation Criteria



% Impervious surface



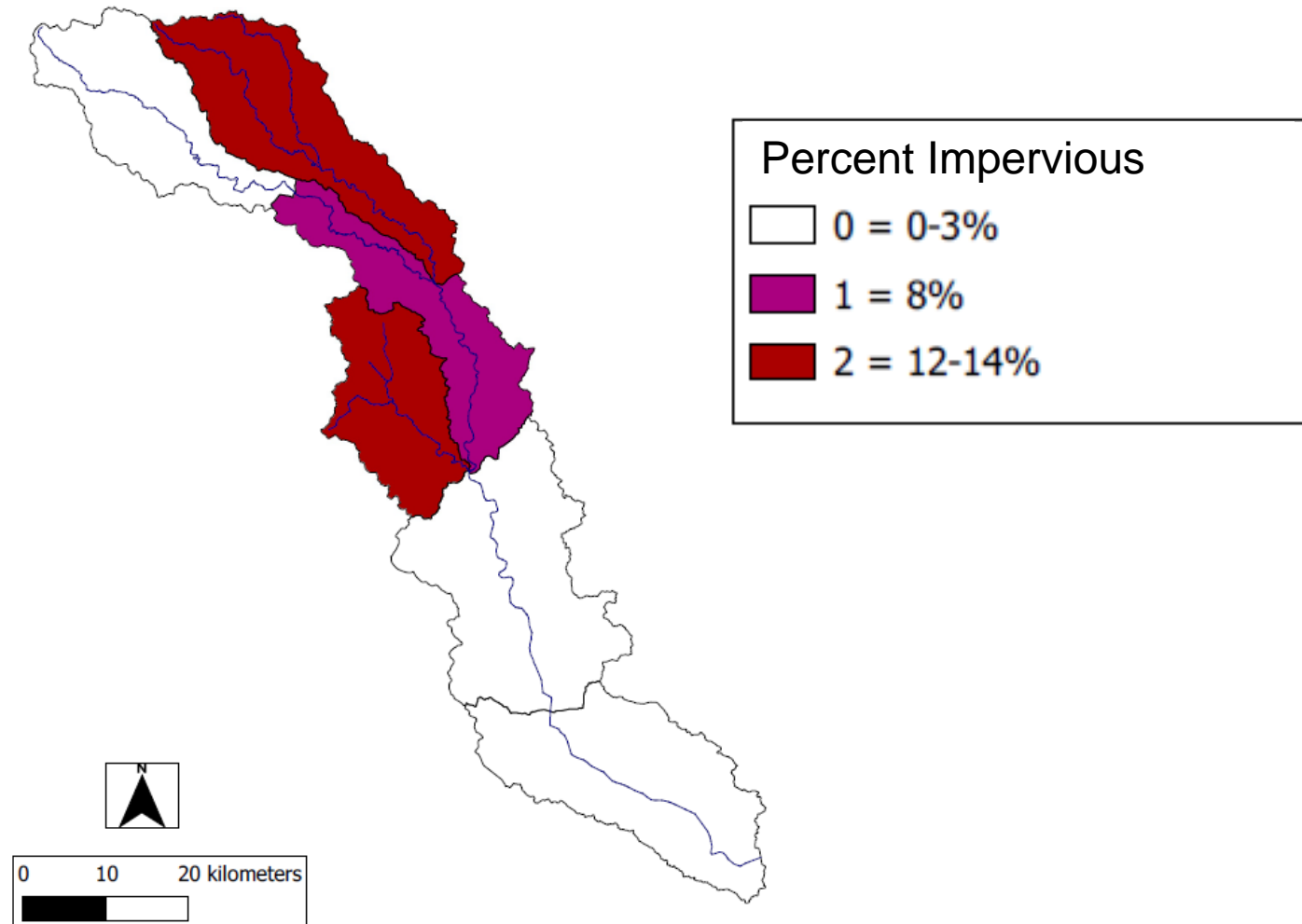
Proximity to streams

Exclusion of existing wetlands

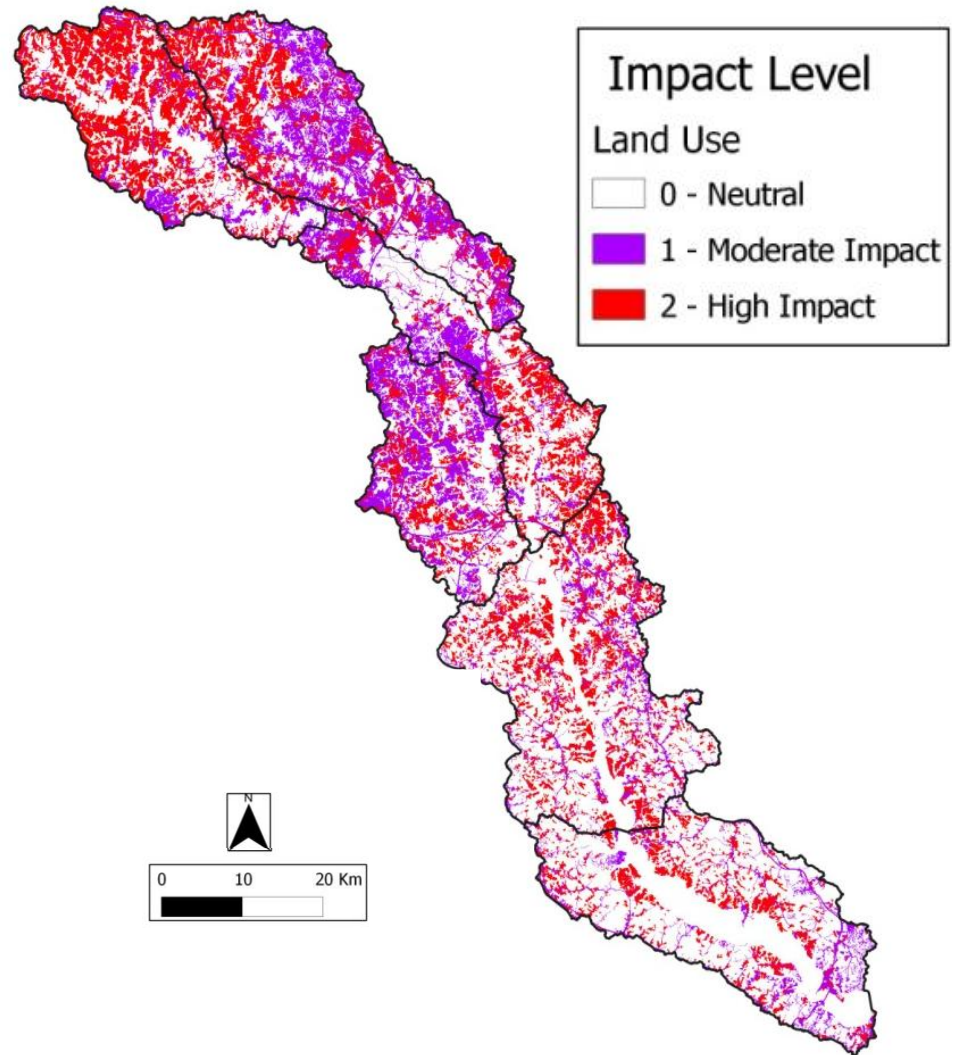


Land Use

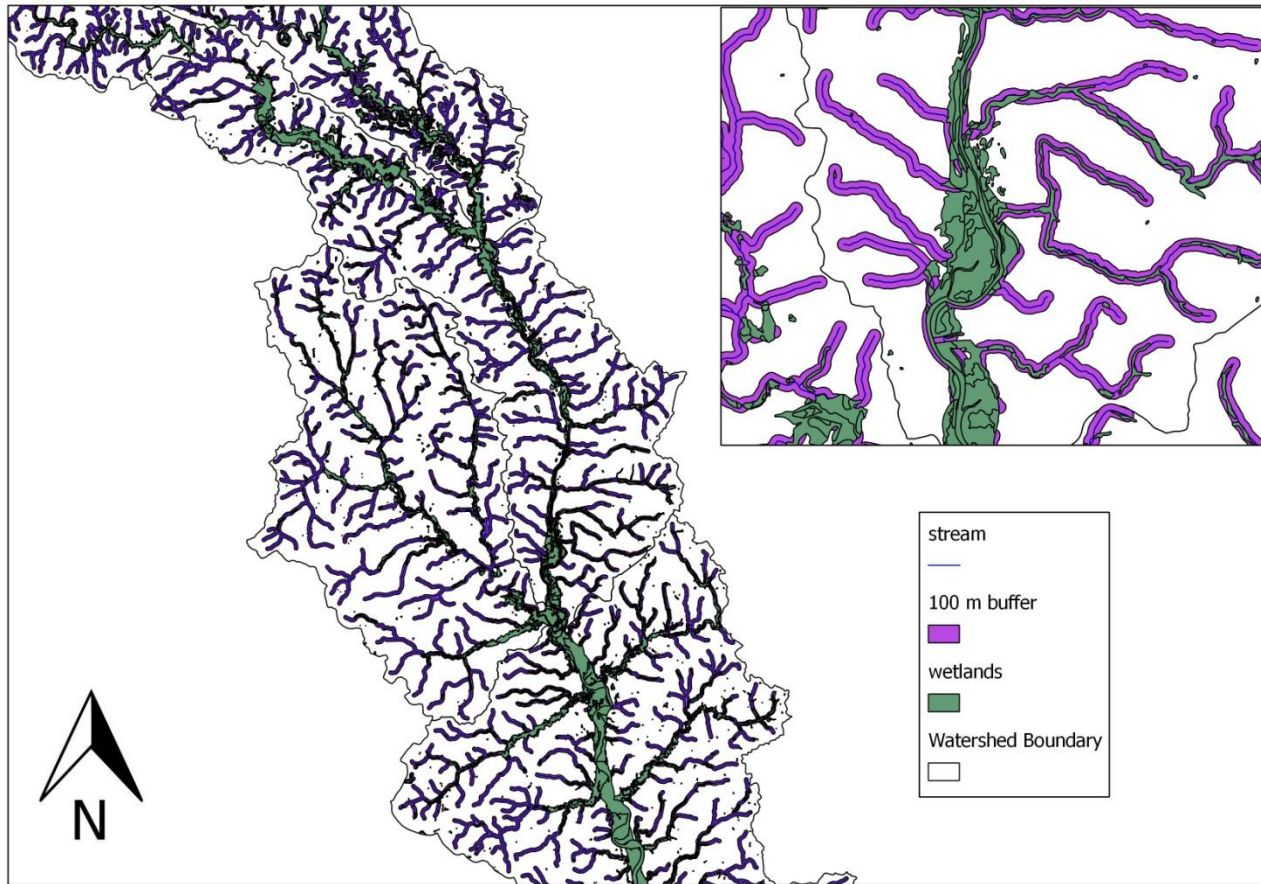
Impervious surface area is concentrated in upper sub-watersheds



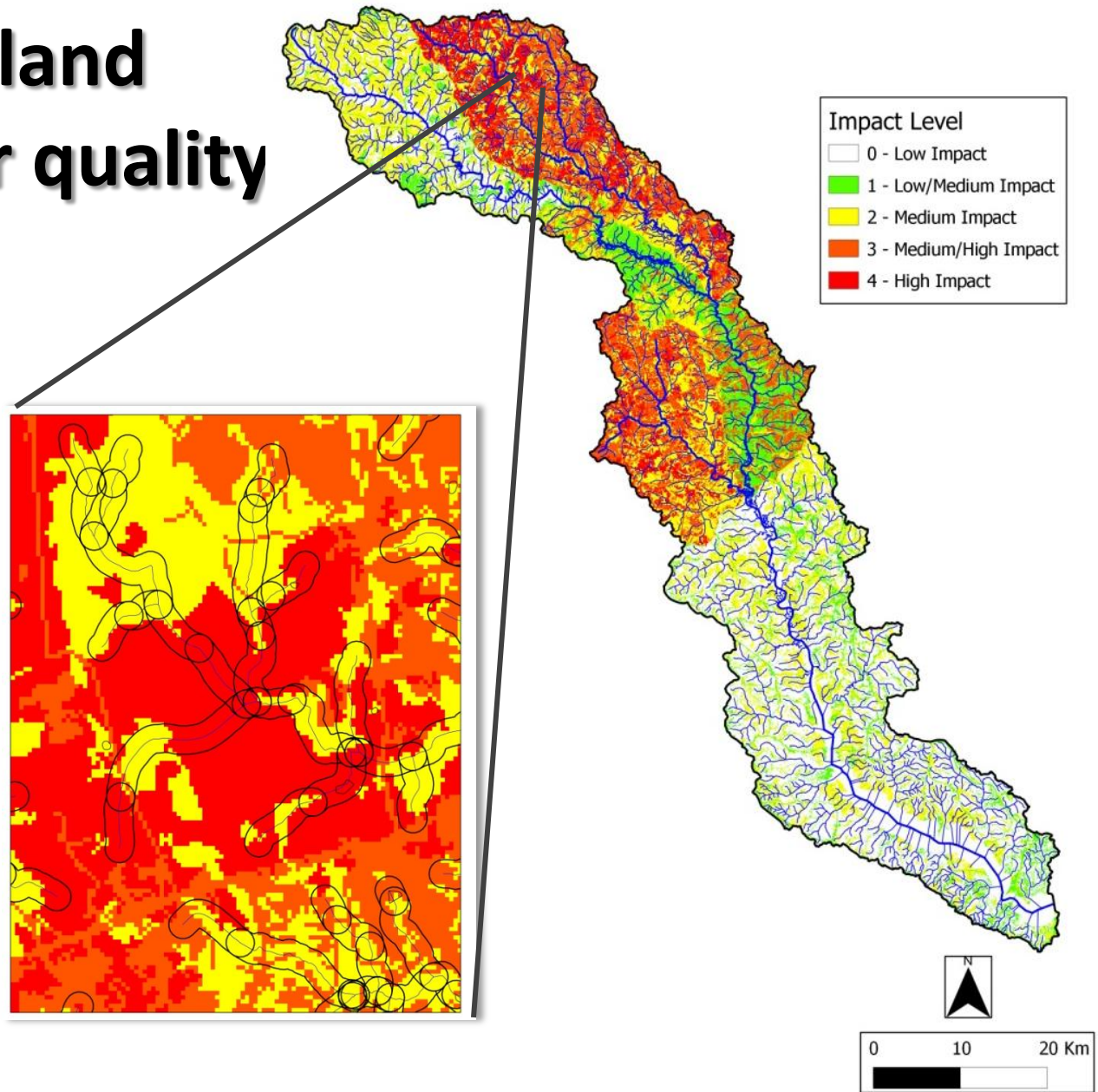
Impacts of land use vary in the Patuxent River Watershed



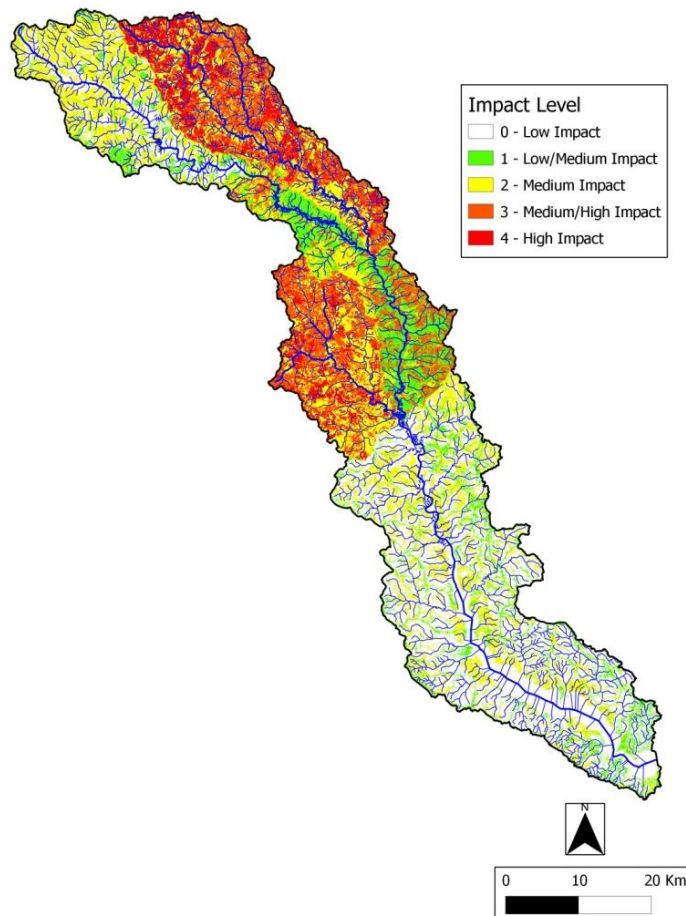
Proximity to streams and exclusion of wetlands



Proposed wetland sites for water quality improvement



Watershed condition is indicative of land use



Patuxent River Reporting Region



High stream nitrate levels correspond to proposed artificial wetland sites

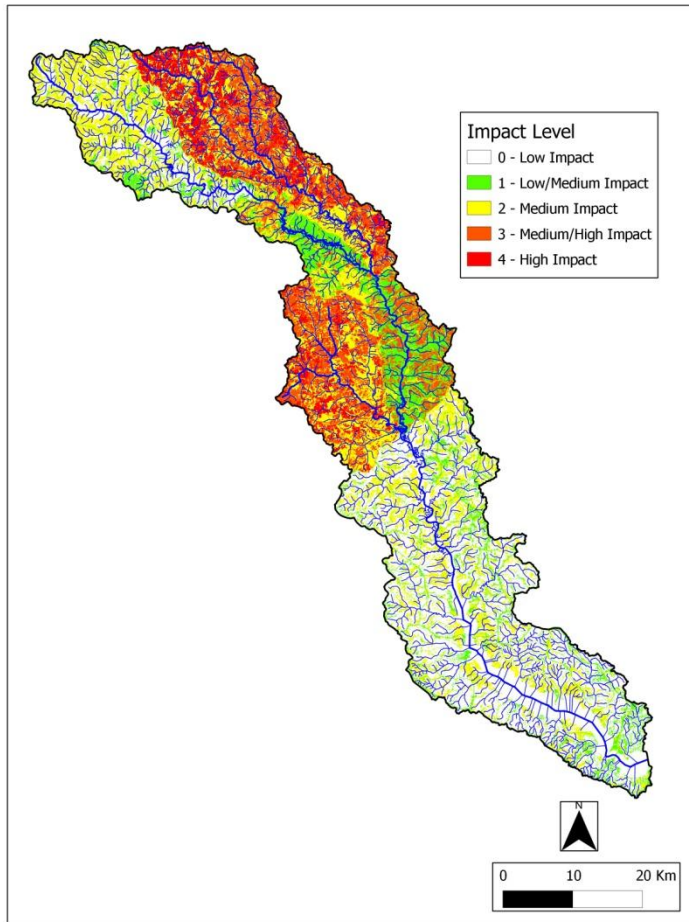
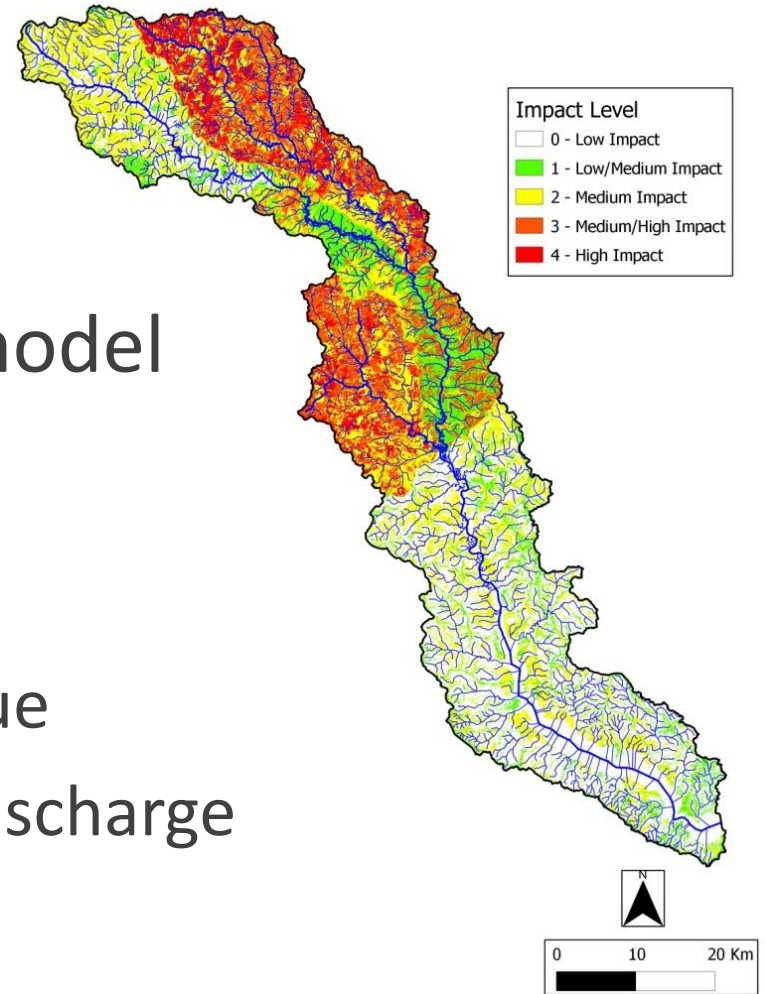


Figure 1. Location of the Patuxent River Basin and stream base-flow measurement sites in the Piedmont and Coastal Plain sections of the watershed.

Conclusions

- ❖ Use water quality data in model
- ❖ Additional criteria include:
 - Property ownership and value
 - Wetland size in relation to discharge
- ❖ Possible extrapolation to entire Chesapeake Bay watershed



Literature and References Accessed

- ❖ United States Department of Agriculture
- ❖ Maryland Department of the Environment
- ❖ Patuxent River Keeper – Patuxent River 20/20 Report
- ❖ Ecosystem Marketplace, US Wetland Banking
- ❖ State of Maryland, Nontidal Wetlands and Waterways Division
- ❖ Environmental Protection Agency
- ❖ NOAA – Chesapeake office
- ❖ U.S. Fish and Wildlife Service
- ❖ Maryland Department of Natural Resources

Acknowledgements



Questions?

