STAC Workshop Draft Report

Nutrient and Sediment Processing Rates of Natural Landscape Features

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The General Question

- Is there any way to link land conservation to the Bay TMDL?
- "credit conservation"?
  - Targeting
  - Incentives
  - 7.8 million acres preserved through 2011
  - E.O. 13508 goal: An **additional two million acres**

Workshop I: Issue Scoping – March 2011

- Separated science questions from policy questions
- Policy Q: Can EPA TMDL policy accommodate "crediting conservation"?
  - Chesapeake Bay Commission is examining this
  - Ann Swanson, Roy Hoagland, et al.
  - Will report later this year

Science Question

- Is there a scientific basis for changing the Chesapeake Bay Watershed Model processing rates that are assigned to natural landscape features to better reflect their nutrient and/or sediment processing?
  - Forests
  - Wetlands
  - Streams

Workshop II – On the Science Question

- Steering Committee:
  - Jim Baird, American Farmland Trust
  - Dan Baldwin, Maryland Department of Planning
  - Mark Bryer, The Nature Conservancy
  - Peter Claggett, USGS
  - Sally Claggett, USFS
  - Christine Conn, MD Department of Natural Resources
  - Laura Dlugolecki, EPA
  - Mike Fritz, EPA
  - Laura Gabanski, EPA
  - Greg Garman, Virginia Commonwealth University,
  - Todd Janeski, VA Department of Conservation and Recreation
  - Steve Faulkner, USGS
  - Ann Swanson, Chesapeake Bay Commission
- Staff: Matt Johnston, Natalie Gardner, Anna Burnett

WORKSHOP PANELS

- Forests – Sally Claggett, USFS
  - Luc Claessens, University of Delaware
  - Bern Sweeney, Stroud Center
  - Don Weller, SERC
- Wetlands – Steve Faulkner, USGS
  - Scott Ator, USGS
  - Greg Noe, USGS
  - Steve Faulkner, USGS
- Streams – Greg Garman, VCU
  - Paul Bukaveckas, VCU
  - Keith Eshleman, UMCES
  - Durelle Scott, Virginia Tech
- Landscapes – Steve Faulkner, USGS
  - Laurel Larsen, USGS
  - Matt Baker, UMBC
- Watershed Model – Gary Shenk, EPA

FINDINGS AND RECOMMENDATIONS

Forest Findings

- For a given watershed, the more forest, the better the habitat and water quality and the healthier the watershed
- The spatial arrangement of non-forested land uses in the watershed affects nitrate concentrations. This metric may be more informative than simply looking at proportional land-use
- Conservation of established forests is preferred over forest restoration given the uncertainty of restoring water quality functions

Wetland Findings

- Wetlands have both the landscape position and biogeochemical processes necessary to retain and transform sediments and nutrients
- Specific retention capabilities of natural wetlands varies; understanding the wetland type, wetland condition, and the inherent controls over the fate and transport of sediments and nutrients is important
- Groundwater flow is important to nitrogen removal by wetlands in the mid-Atlantic Coastal Plain
- The amount of nutrients and sediments retained by floodplain wetlands increases with increasing hydrologic connectivity with the river

Streams Findings

- Healthier, unchannelized streams are more likely to have higher nutrient retention efficiencies and deliver lower nutrient loads downstream
- Streams in forested watersheds may have lower nitrate-N loads than reflected in the Chesapeake Bay Program Model
- Streams with high transient water storage demonstrate increased nutrient retention

Landscape Findings

- The spatial arrangement and hydrologic connectivity of landscape features affects fluxes of sediments and nutrients from watersheds to aquatic ecosystems
- Analytical approaches including directional connectivity index, multi-direction flow fields, flow-path analysis, and buffer characterizations relative to network position can be used to better quantify the landscape-stream connectivity and sediment/nutrient retention

Recommendations

- The Chesapeake Bay Program should pursue upgrades to the Chesapeake Bay Watershed Model that provide for more accurate estimates of nutrient and sediment loading rates based on the considerations discussed in this report
- Identify and map riparian forest, forested floodplains, and other wetlands as new land-use classes
- Adjust loading rates based on spatially explicit landscape attributes , including directional connectivity, multi-direction flow fields, and flow-path analysis

Recommendations

- Adjust loading rates based on landscape feature attributes including type, condition, (and possibly forest age)
- Use scenario analysis to identify most effective landscape features and configurations
- Consider investing in models for use at the local scale

Next Steps

- STAC Review of draft written report
- Transmittal to WQ GIT, Modeling Workgroup