

Biomass Energy & TMDL Challenge



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Overview

- TMDL Basics and History
- Chesapeake Bay TMDL
- Biomass Opportunities


What is a TMDL?

Total Maximum Daily Load

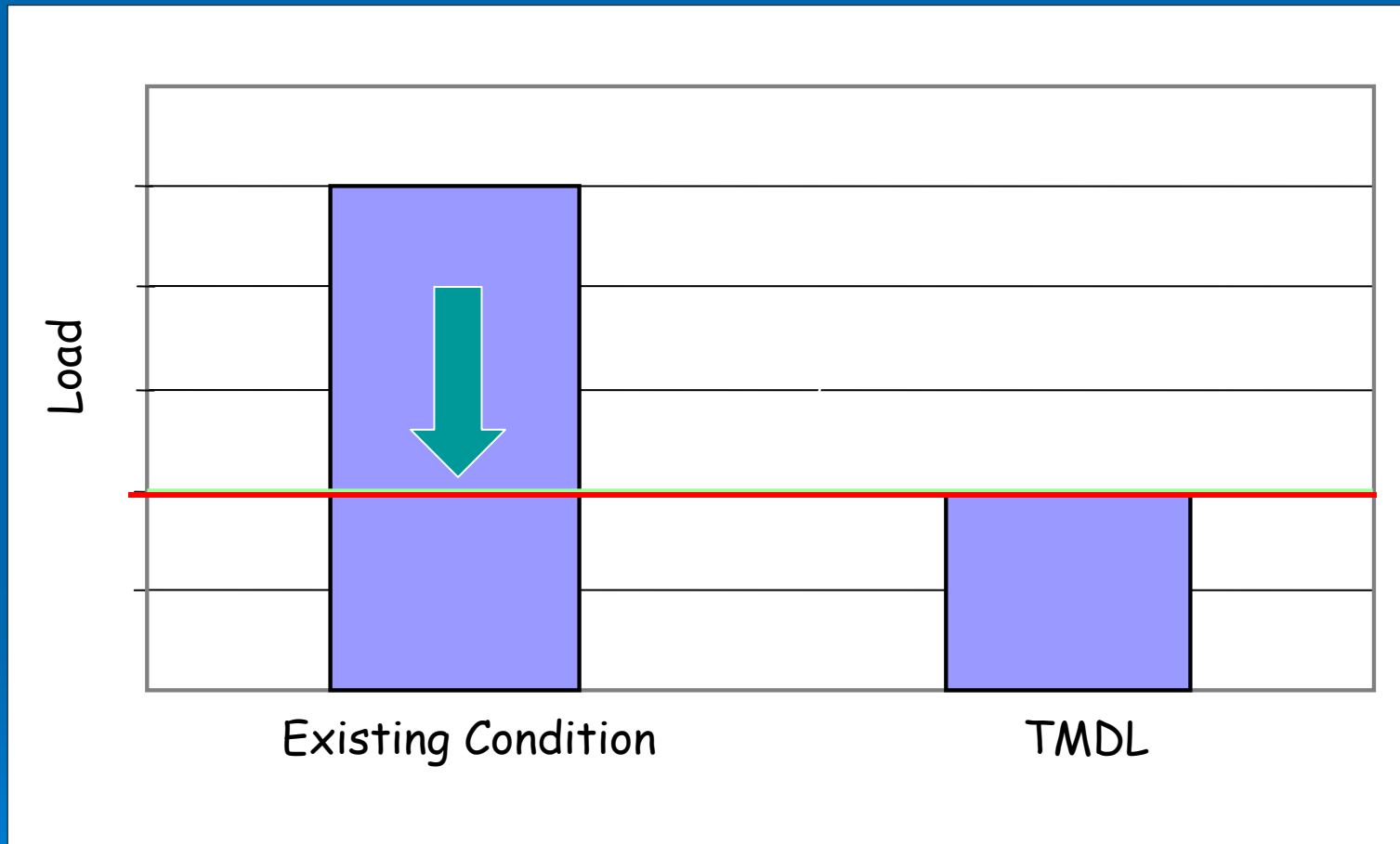
- maximum amount of a pollutant that can enter a waterbody without violating water quality standards (WQS)
- Called a pollution budget or pollution “diet”
- Watershed “clean up” plan which establishes restoration goals.
- Link to other programs for coordinated restoration activities.

What is a TMDL?

Water Quality Standards

- numeric or narrative limits on pollutants that ensure the protection of human health and of aquatic life
 - Purpose of WQS is the protection of designated uses:
 - Primary Contact Recreation
 - Aquatic Life
 - Wildlife
 - Fishing
 - Shellfishing
 - Drinking Water
- 

Example TMDL



Reducing load in the impaired watershed to the target TMDL load is expected to restore water quality

Clean Water Act (1973)

- Requires Water Monitoring (Section 106)
- Requires Biennial Assessment (Section 305)
 - Are water standards being met?
 - YES. Keep monitoring water conditions.
 - NO. Waterbody is added to impaired waters list [Section 303(d)]
- Requires TMDL Development (Section 303)
- In Virginia, TMDL Implementation Required (WQMIRA)

Water Quality Management, Information, & Restoration Act of 1997

- Reiterates federal requirement for state to conduct water quality monitoring and assessments
- States that VA Natural Resource agencies **will implement** TMDLs
 - Precedent established
 - Clean Water Act only suggests implementation
 - VA State Law goes above and beyond CWA
 - Very few states have this mandate

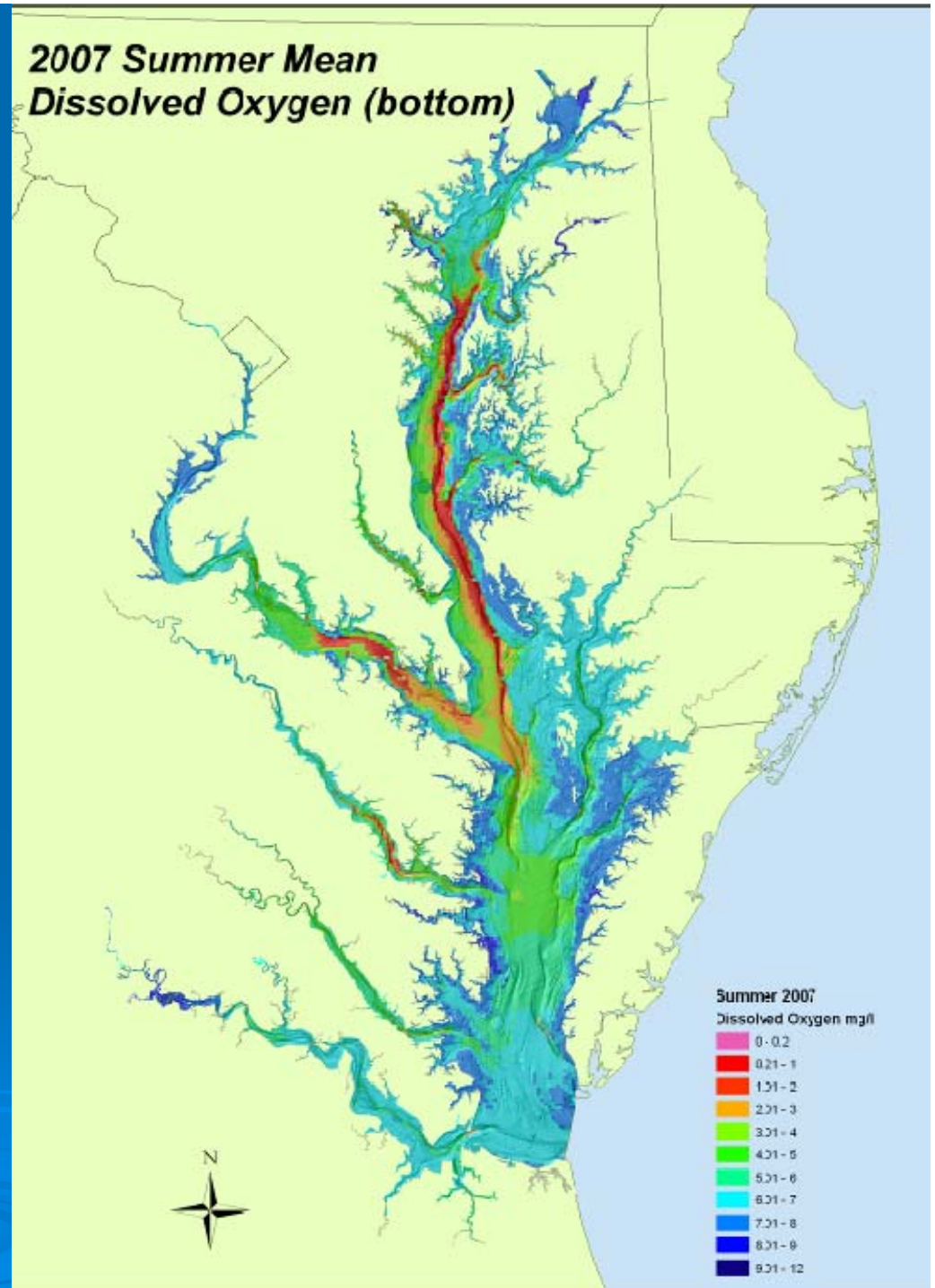


Chesapeake Bay TMDL



Low to no
dissolved oxygen in
the Bay and tidal
rivers every
summer

High sediment
levels from upland
areas

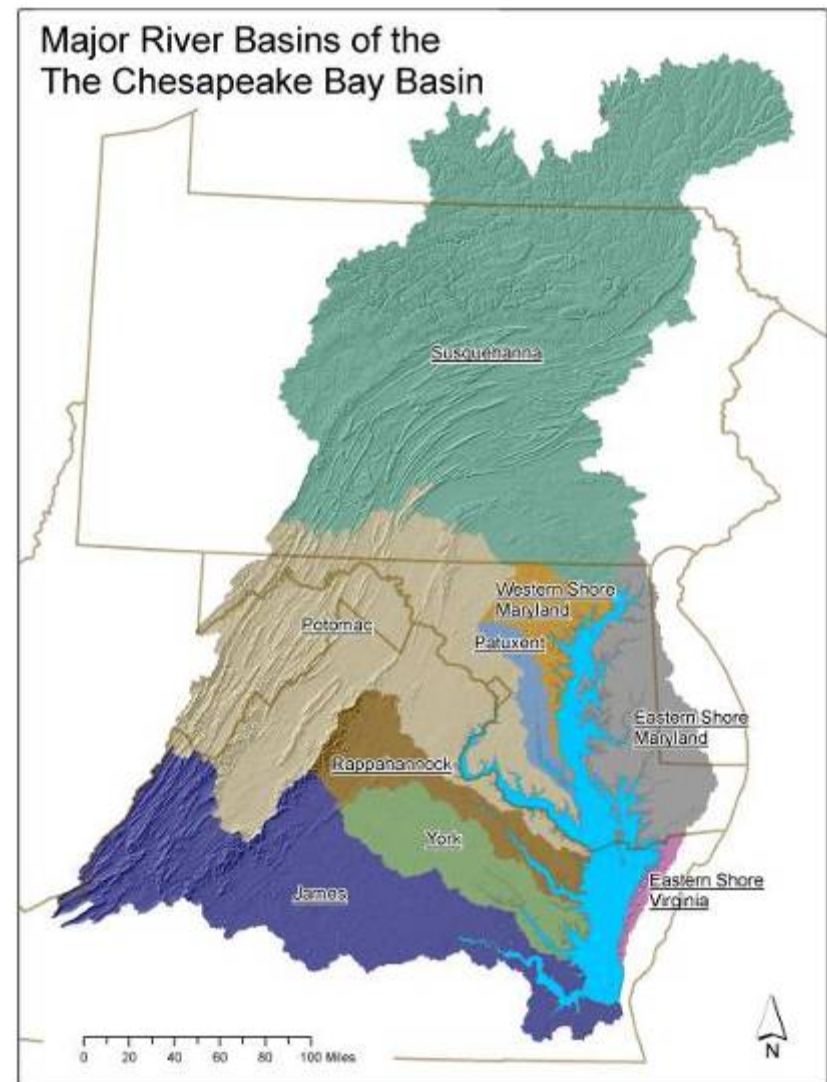


A Different TMDL...

- Multijurisdictional (7 - 6 states and DC). Largest TMDL in US history.
- EPA Chesapeake Bay Program long existing. Much work already done.
- Local-scale allocations will be determined
- Implementation planning is part of TMDL. Authorization under Ches Bay Program legislation.
- 2 year milestones for meeting water quality goals
- Consequences for states if fail to meet milestones

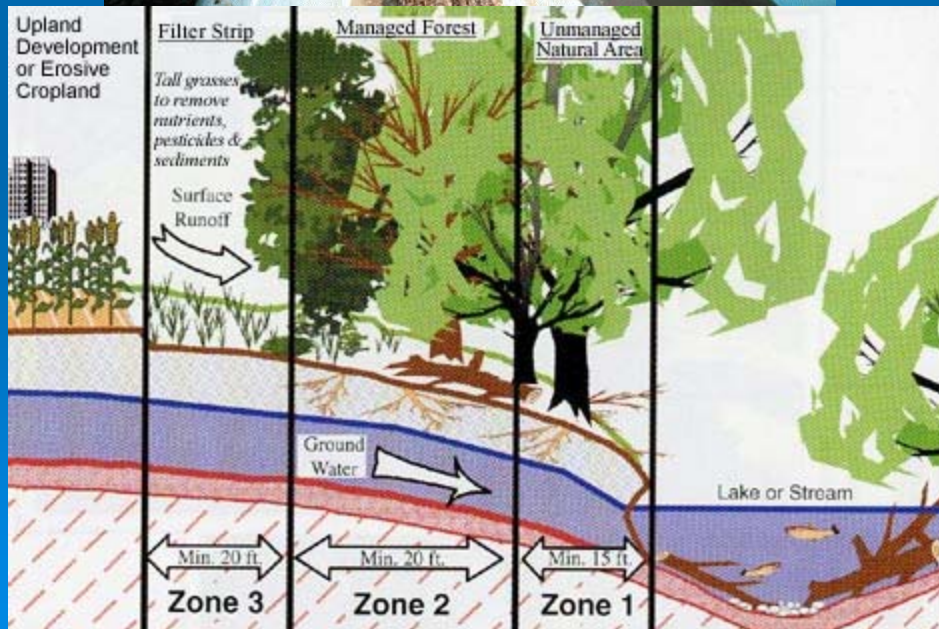
Chesapeake Bay TMDL

- EPA sets pollution diet to meet states' Bay clean water standards
- Caps on nitrogen, phosphorus and sediment loads for all 6 Bay watershed states and DC
- States set load caps for point and non-point sources
- Draft available for public review/comment Aug 15-Oct 15; final published by EPA in Dec 2010





Biomass Opportunities to Positively Influence Water Quality



Warm Season Grasses

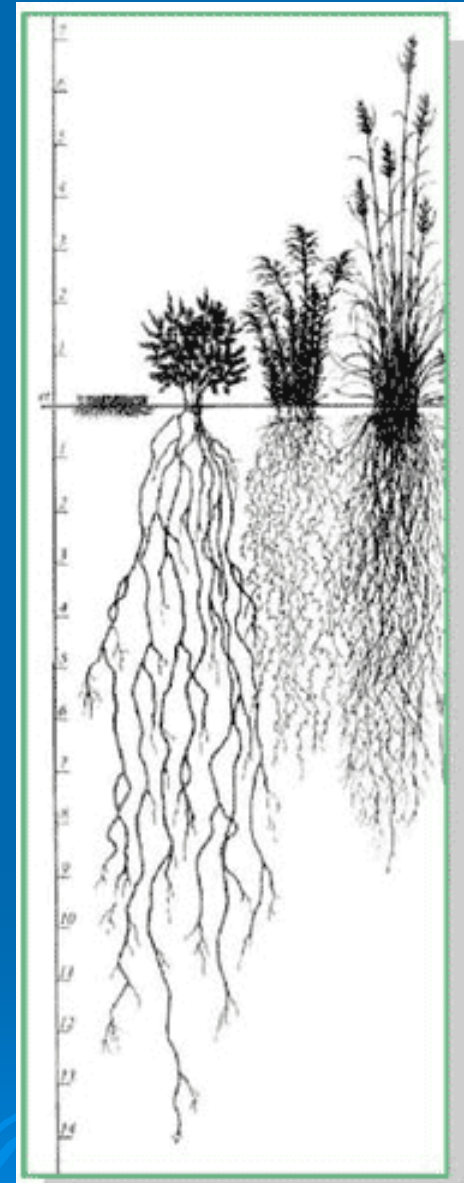
- Deep root systems
- High nutrient & sediment removal efficiency
- Easily adaptable to agricultural management systems
 - Pasture/hay
 - Riparian Buffers (pasture/cropland)
 - New crop for biomass market
- Switchgrass, gammagrass, big & little bluestem, etc.



Warm Season Grasses

Urban Communities

- BayScapes
 - Conservation landscaping program
 - Homeowners, businesses, government facilities
- Urban Stream Buffers
- Benefits
 - Reduces landscapes maintenance; less mowing than lawns, reduced carbon footprint
 - Aesthetically pleasing
 - Creates wildlife habitat
 - Reduces urban stormwater



Root length of conventional turf grass (left) as compared to native plant roots (right)

Science Museum of VA BayScapes

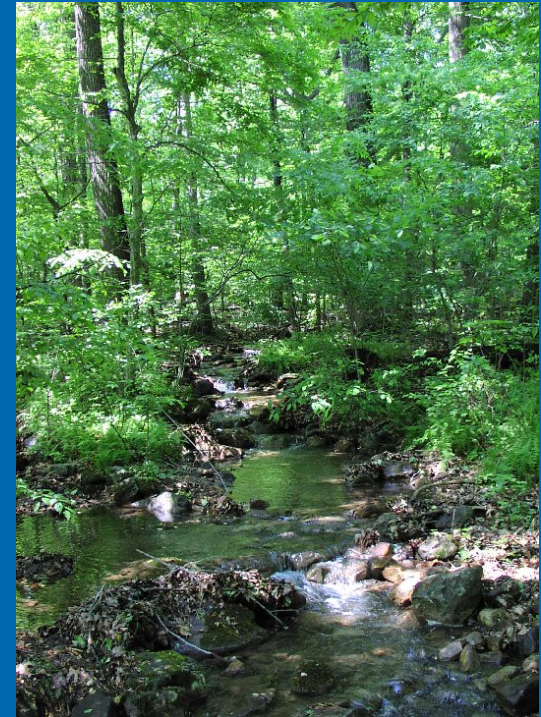


Science Museum of VA BayScapes



Trees

- Agriculture & Forestry
- Deep root systems
- Riparian Buffers
- High nutrient & sediment removal efficiency
- Easily adaptable to agricultural management systems
 - Pasture/hay
 - New crop for biomass market



Urban Trees

- Deep root systems
- Riparian Buffers
- High nutrient & sediment removal efficiency
- Upland trees reduces stormwater; allows to soak into ground
- Reduces urban “heat island” effect; reduces energy use



Urban Trees

- Potential biomass resource
- Locality's need to manage trees & dispose "waste products"
 - Especially an issue during hurricane season
- New developments where land clearing (forest conversion) occurs
- Traditional disposal includes landfill, pulp, mulch, or burning
- Opportunities exist for using waste products for energy production



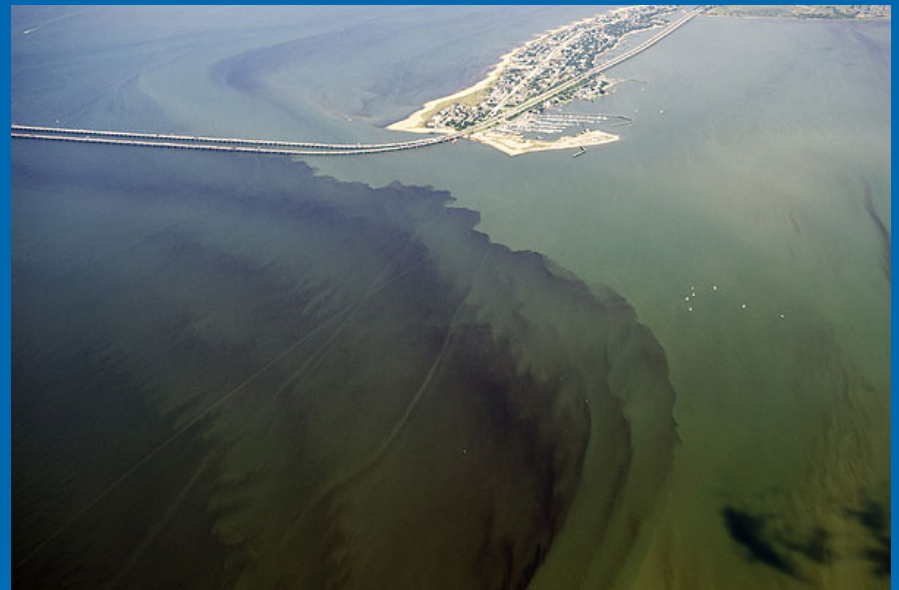
Biosolids Management

Agricultural and Urban

- poultry litter/livestock manure
 - Contributes to water pollution (nutrients, bacteria)
 - As a biomass resource, can help improve water quality (locally and in Bay) by reducing land application
- Human Biosolids
 - Highly controversial
 - As a biomass resource, can help improve water quality (locally and in Bay) by reducing land application

Algae

- Significant interest in the use of algae for biofuel production
- Chesapeake Bay could benefit from “algae harvesting” if technology develops for biofuel conversion
- Dissolved oxygen impairment is directly related to excessive algae due to excessive nutrients
- Research continues



“Algae blooms spreading in Chesapeake Bay”

The Virginian-Pilot
© August 20, 2009

Wrap up

- Significant opportunities exist to achieve multiple management objectives in the biomass industry
- Upcoming federal mandates to improve water quality could provide additional opportunities
- New partnerships can be established
- New markets for both agriculture and urban communities can be created – balancing both environmental protection and economic prosperity

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